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Which explains why Microsoft® Excel has been the spreadsheet standard for Macintosh® ever since it was introduced in 1985. Today, 90% of Macintosh spreadsheet users do their calculating, manipulating, analyzing and presenting with it.

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You can easily build complex models, and conveniently link multiple sheets with a simple point and click.



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Profitability by division

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WxC 2000

		JUL	AUG	SEP	OCT	NOV	DEC
Revenue *(In Thousands)*	Actual	$8,400	$12,300	$13,900	$8,700	$13,000	$21,300
	Forecast	$6,453	$8,800	$10,050	$9,460	$12,000	$18,900
	Variance	$1,947	$3,500	$3,850	($760)	$1,000	$2,400
	%	130%	140%	138%	92%	108%	113%
Cost of Goods Sold	Actual	$1,848	$3,198	$3,475	$2,262	$2,860	$7,663
	Forecast	$1,549	$2,288	$2,312	$1,608	$2,640	$3,969
	Variance	$299	$910	$1,164	$654	$220	($3,969)
	%	119%	140%	150%	141%	108%	0%
	Gross Profit	**$6,552**	**$9,102**	**$10,425**	**$6,438**	**$10,140**	**$21,300**

WxC 1000

		JUL	AUG	SEP	OCT	NOV	DEC
Revenue *(In Thousands)*	Actual	$2,184	$3,198	$3,892	$2,610	$4,030	$5,325
	Forecast	$1,613	$2,200	$2,513	$2,365	$3,000	$4,725
	Variance	$571	$998	$1,380	$245	$1,030	$600
	%	135%	145%	155%	110%	134%	118%

ut of ten calculating lative people.

it's been changed in Microsoft Excel.

To insure data integrity, we've even built in alerts that will warn you of such grievous errors as circular references. In fact, Microsoft Excel is so bright, it will actually review your worksheet and flag any formulas that don't fit an established pattern.

Furthermore, the search and replace function can make corrections on a global scale. And customized number formatting lets you bend the rules, allowing you to create everything from a 3-digit account code to a 17-digit part number.

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MEMO:

TO: *Shannon Pitts*

FR: *Peter Cohen*

DT: *November 13th, 1989*

RE: *Presentation to the Board*

In preparation for the annual meeting, I've created a 20-minute slide presentation on our successful entry into the small printer market.

The presentation will explain to the shareholders that, on a basis of sound marketing strategy, reinforced with our knowledge of the printer business at other levels, we have been able to grow from a 2 percent share of market, to 9 percent in 18 short months.

To the right is an excerpt of the presentation which illustrates our growth. Anticipated concerns will probably center around quality of service and the ability to meet market demand over the next year.

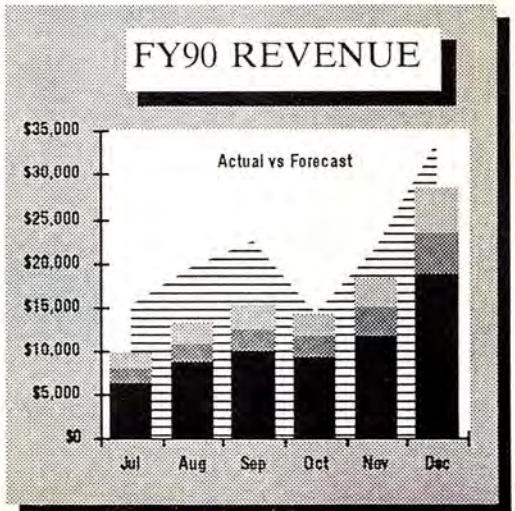
We should be able to squelch any fears by explaining that our small printers have a very low (4%) field repair call requirement at present.

And our assembly resources here in the

WxC 2000

	JUL	AUG	SEP
Revenue *(In Thousands)*			
Actual	$8,400	$12,300	$13,900
Forecast	$6,453	$8,800	$10,050
Variance	$1,947	$3,500	$3,850
%	130%	140%	138%

With a very respectable 9 percent share after only 18 months, we feel we can reach 15 percent by the end of the next fiscal year (see six month projection).



MacUser

StartUp



News **46**
Guy Kawasaki lists the top ten reasons to dump the Mac for Win3 — and another ten not to. Plus the latest industry news, rumors, updates, reviews of the hottest new products, and more.

Bobker's Dozen **48**
BY STEVEN BOBKER
Quick looks at 13 little-known products: **MultiClip** multiplies Clipboards for graphics applications, **FastLabel** designs and prints iconic labels, and **Hyper Toolkit** provides lots of HyperCard development tools and XCMDs. Plus **Bridge, miniWriter, INITPicker, HyperSpeller, Reunion,** *Media Letter,* **3-Meg Static RAM Card, Number Munchers, Dietician,** and **File Director.**

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Audiomedia: A NuBus card and software package from Digidesign that can turn your Mac II into a CD-quality recording studio. **55**
MORE 3.0: Symantec has developed what was once a simple outliner into a presentation package so powerful it can compete with Persuasion. **57**
RasterOps Video ColorBoard 364: RasterOps' new card combines terrific 24-bit color with live video. **59**
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33 Unsung Shareware Programs
BY ROGER GILBERT
Beyond today's shareware hits, a host of new (or simply undiscovered) programs awaits you, including ASCII Chart DA, Blesser, Color Bits, Dir-Acta-Ry, and BundAid. Plus: How to join Zmac and access an instant shareware library. **244**

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BY MICHAEL SWAINE
Discover the Slow switch and other tricks for trapping INIT problems, find out about the man at MITS, and get a lesson in keeping your wits about you until System 7 arrives. **255**

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BY THOM HOGAN
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BY KURT W. G. MATTHIES AND THOM HOGAN
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Solutions

A Digital Portrait Montage

BY THE EDITORS OF *VERBUM* MAGAZINE

This step-by-step guide shows you how to take scanned and modified photos in order to create a striking montage that has an embossed 3-D-ish look. **214**

Prepress: The OPI Option

BY KEITH BAUMANN AND AILEEN ABERNATHY

The new Aldus OPI (Open Prepress Interface) may help streamline the transmission of TIFF images from design to prepress. **219**

The NeXT Cube Almost Gets a Mac Floppy-Disk Drive

BY STEPHAN SOMOGYI AND THE MACUSER NETWORKSHOP STAFF

MacUser NetWorkShop evaluates three products that let you transport files on Mac floppies into floppy-free NeXT machines. **220**

Coming Soon to a Mac Near You: ISDN

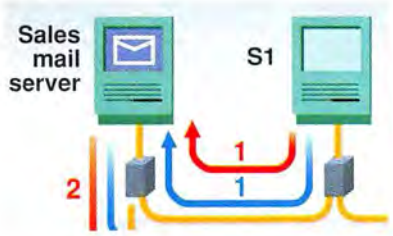
BY STEPHAN SOMOGYI

Apple is jumping on the ISDN (Integrated Services Digital Network) bandwagon, which zips along 26 times faster than a 2,400-bps modem. This is the future of voice/data communications, and it's here today — sort of. **227**

Work Groups or Work Teams?

BY KURT VANDERSLUIS

Now you can forget all about the organization chart: Here are three ways to design E-mail networks that can satisfy real-life interdepartmental requirements. **234**



MacUser Labs



Buyer's Guide: The Letter-Perfect PostScript Printer

BY BRUCE FRASER, PAUL YI, AND THE MACUSER LABS STAFF

MacUser Labs rates 19 popular PostScript printers for image quality, speed, ease of use, and true PostScript compatibility. We help you pick the printer that's best for you, whether you need a compact personal printer, a network workhorse, or a desktop-publishing tool. Plus five new personal PostScript printers that are on the horizon and our complete guide to testing PostScript printers yourself. **89**

The Golden Age of Gray Scale

BY OWEN W. LINZMAYER AND THE MACUSER LABS STAFF

Large gray-scale displays (monitors paired with NuBus cards) have improved greatly in quality and value over the past year. The Labs tests four new ones, comparing factors such as focus, MTF, screen geometry and brightness, gray linearity, and nuisance factors. **150**

What a Color Retouching Program Can Do for You

BY KEN MILBURN

Color-image-retouching applications can put professional darkroom techniques at your fingertips. PhotoMac, Photoshop, and ColorStudio offer three very different solutions. . **172**

Power Presentations

BY PETER POLASH, KATHLEEN TINKEL, AND HOWARD BORNSTEIN

Use the latest hardware, software, services, and techniques to make your next slide show a hit. In "The Hidden Persuasion," you'll find 30 ways to exploit Aldus Persuasion. "The Best Picture Show" tells you how to make slides on the Mac and helps you break through the barrier between Macs and slide-imaging programs. And "Running the Show" helps you get the most out of LCD overhead-projector panels and video-projection systems. **191**

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A package deal. **25**

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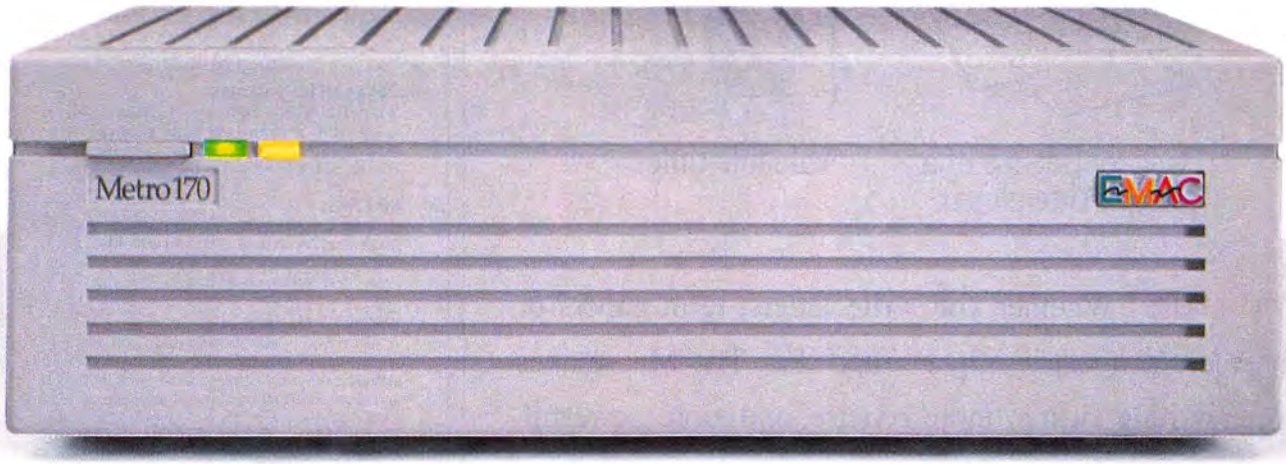
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Help Folder
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Calling All Programmers
We'd like to hear from any programmer who is interested in contributing to our utilities disk or labs-benchmark disk series. If you're interested, contact Michele Stokol at the address above.

GO ZMAC
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Writing for *MacUser*
If you have an idea for an article you'd like to write, we'd like to read it. Send a query letter with samples of your writing (published, if possible) and some information about your background to Jon Zilber, Executive Editor, *MacUser*, 950 Tower Lane, 18th Floor, Foster City, CA 94404. No calls please. Since we rarely buy unsolicited manuscripts, save yourself some work and don't send us a completed article without writing to us first. Please allow four to six weeks for a reply.

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MAC ON-LINE

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For assistance in membership, billing or passwords call CompuServe Customer Support at (800) 848-8199.

About MacUser

Charity Begins Here

We believe folks should practice what they preach. For example, the writers of our Power Programming column, Kurt W. G. Matthies and Thom Hogan, have written their share of serious code. This month you can see for yourself, because we're going to start making some of their programs available to you.

The first is MacUser's Security. Kurt developed this product in conjunction with the September '90 Power Programming column (page 329), which documented the development of Loser, a utility that makes files invisible on the desktop. Two other security utilities, a file killer and a file locker, combine with the Loser file hider to make up the MacUser's Security package.



Kurt Matthies cowrites *MacUser*'s Power Programming column; he also writes power programs you can now get free on Zmac.

Shredder, the file killer, obliterates deleted files by overwriting them completely. Not even commercial methods can retrieve files that Shredder has wiped out. Scrambler, the file locker, encrypts files by using a high-level security algorithm.

Kurt and Thom's column will feature more do-it-yourself software in the future.

We're giving this software away to encourage you to join Zmac, *MacUser*'s on-line companion. Zmac is available to CompuServe (CIS) users; just issue a GO ZMAC command at any ! prompt. If you're not a CIS member, you can sign up for Zmac by following the directions in the Zmac ads found elsewhere in this issue.

Of course, Kurt and Thom aren't the only programmers who contribute to *MacUser*. We're going to make other *MacUser* coders' creations available on Zmac as well. This month we're also introducing two other programs: MiniFinder Finder and DiskBasher!.

MiniFinder Finder, written by David Drucker, a Cambridge, Massachusetts-based interface consultant, works with the MiniFinders HyperCard stack already available on Zmac. MiniFinder Finder selects products in the stack according to several criteria. The code is open; therefore you can use it to explore HyperTalk nuances as well as to find the reviews you need.

Our third program, DiskBasher!, is used by MacUser Labs to measure hard-disk performance by writing, seeking, and reading a file on the disk. DiskBasher!, written by *MacUser*'s Stephan Somogyi, is the first in a series of MacUser Labs benchmark utilities.

So log onto Zmac now to get these three free programs. They'll help you practice the proficient user's work style that you too probably preach.

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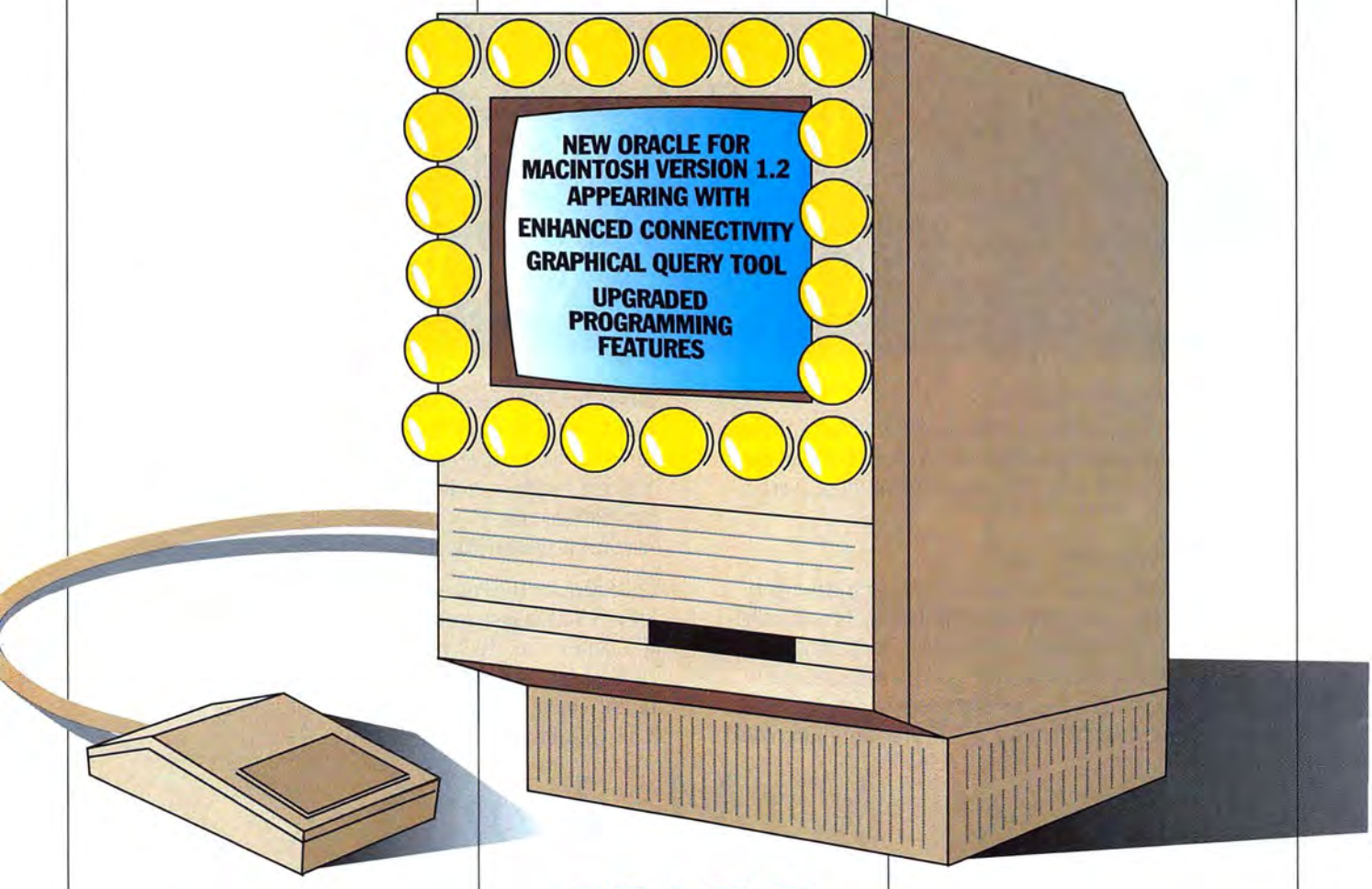
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LETTERS

COMPILED BY JAMES BRADBURY

Driving His Daisy Chain

Thanks for Thom Hogan's excellent article in the August *MacUser* ("A Beginner's Guide to Daisy Chains," August '90, page 243). He gave me the courage to do something I'd never heard anyone recommend — terminate only the last device in a SCSI chain. I'd never thought to deviate from the advice that most manuals offer: Terminate the first *and* last device. I have an external (internally terminated) hard-disk drive and a GCC Personal Laser Printer, and up to now, I've had to leave the printer on to mount my hard disk. By removing the termination from the PLP, I can mount my hard disk without the printer's being on.

Hogan's analogy to the black arts was right on; for me, too, SCSI chains have always seemed supernatural. In fact, I've always felt that computers are only an elevated form of superstition. Thanks for confirming my hypothesis.

Gib Veconi
New York, NY

ImageWriter's Bloc

Your review of color printers ("Color on the Page," May '90, Buyer's Guide page 56) omitted any reference to the ImageWriter. Your writers are arrogant in their commercialism and expertise, feeling flush with cash and the best of equipment. I have read that somewhere around 65 percent of Macintosh users also use the ImageWriter — a fact that one would never guess at all from your columns. Of course, the ImageWriter is not the fanciest and best of color printers, but for my purposes, it produces superb results.

A.G.W. Lamont
Picton, Ontario
Canada

Our review focused on printers that began their lives in color — any dot-matrix printer can be coaxed into color duty with the right ribbon. Even the proletarian ImageWriter can produce creditable color output, especially when helped by shareware gems such as CheapColor or Picture Colorizer (both available from our on-line service, Zmac). — RM



Phil Brown of Austin, Texas, wants to see greener Apples:

"Today I unpacked a new Mac. In the box was a large foam package labeled 'Open Second.' A wraparound sheet of heavy glossy paper and the omnipresent shrink-wrap covered the box. A piece of clear plastic inexplicably covered the front of the wraparound sheet. Encased in the thick foam was not a disk drive, not a priceless vase, but manuals!

"It looks like marketing departments are completely out of control when it comes to packaging disks and books. This stuff wastes trees, clogs landfills, and is a royal headache to handle in the office."

A Fool Warranty

After years of consumer whining, Apple has extended its product warranty to a full year. A victory for Mac users everywhere, right? I guess Apple has been cheating its customers out of nine months of warranty for the past ten years — or has it?

While IBM and the bulk of the PC world offer a one-year warranty, in most cases it is a one-year *limited* warranty with a 90-day full-service warranty. This means that, beyond the 90-day warranty, items that commonly fail (such as the power supply) are no longer covered while things that almost never fail (such as the system board and memory chips) are unconditionally guaranteed.

In the past, Apple's position has always been to offer people not satisfied with the 90-day warranty a comprehensive service-contract program called AppleCare that they could subscribe to in yearly or monthly increments. If anything goes wrong with your equipment while you are under AppleCare, take it to any authorized Apple dealer for repair, free of charge.

So we finally have our comprehensive warranty — but what have we given up? Well, for those of you who thought that Apple's products were on the pricey side, brace yourselves. With Apple's new warranty commitments, expect a price increase. As you may have guessed, PC users have been paying for their puny limited warranties all along.

Scott Miller
Pensacola, FL

SPY's Like Us

While flipping through your May '90 issue, I was appalled to discover the spread on pages 36 and 37 ("A Power Play"). Your pillaging of *SPY* magazine goes beyond just concepts — you might at least have changed the artistic style of the caricatures. Am I accurate in visualizing your staff members (or maybe it's just that

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LETTERS

Kawasaki Guy) working up material and compositions with *SPY* magazine lying open and well studied in the upper right-hand corner of their desk?

Scott Dunn
New York, NY

You're right; Guy's inspiration came directly from SPY *(as he threatened in his debut column, March '90, page 33), although he obviously made up the parts about Sculley, Loren, Spindler, Campbell, and the Mac. The folks at* SPY *have seen the piece and have already threatened us with a "good-natured ribbing." — JB*

The Running Mac

In answer to John C. Dvorak's statement that he's amazed that the Mac "is so easy to get up and running" ("Joke, Reminiscence, Fact, History," July '90, page 302), as a consultant, I'm even more amazed at how the Mac gets up and running when it shouldn't. I've seen numerous installations on the brink of disaster. Several Systems on a hard-disk drive, files in the System Folder that shouldn't be (mystery INITs), or files not in the System Folder that should be. That the client's Mac had been reasonably productive at all is truly a miracle that has "no precedent in the world of the IBM PC clone."

SHAZAM! It even runs when you do it wrong!

Sharon Mendenhall
Las Vegas, NV

C's the Light

I've been a C programmer for two years and was surprised to see how different Mac programming was. I had just begun my own C project on my Mac IIcx, and the tech talk was getting *pretty* dry.

Enter Kurt (I've got four initials) Matthies and Thom (no relation to Hulk) Hogan with excellent coding examples and a "we won't be defeated" attitude. I must have said, "Oh! Now I understand!" at least ten times for each month's article! Way to go, guys! So when is your OOP coding article? My breath is bated!

Rocky Olive
Apex, NC

In "Scroll Your Own" (July '90, page 238), Kurt Matthies and Thom Hogan write, "We've discovered a gaping hole in the Mac programming literature regarding scrolling, and we wonder why it exists." Fact is, this hole has already been filled by myself and other contributors to *MacTutor* magazine.

My article "Window Scroll Bars" appears in the March '89 issue; "All About Scrolling Windows" by John A. Nairn appears in the April '89 issue. Both articles include full source code; mine in MPW Pascal and Nairn's in THINK C. Readers of your magazine who want to study the topic in more depth should have a look at these articles.

Joe Zuffoletto
Cupertino, CA



Dear Mr. Sculley . . .

. . . When we asked readers to come up with some fresh **marketing slogans** for John Sculley and Apple, the response was immediate, although not always as fresh as, say, the latest Apple org chart. Brian Marantz, of Irvine, California, for instance, suggested "The Macintosh Way." Sorry, guy, that one's taken. His other idea — "MIS: Macintosh Interface Superiority" — has commendable pith, but we think some old-timers might take it amiss.

Tom Kraus, of Cazadero, California, suggests "Follow us!" Yes, but that presupposes that we know where the heck they're going.

"You'll Hate the Company, But You'll Love the Machine" comes from B. Freer Freeman, of Arlington, Virginia. So much for Apple's warm, fuzzy corporate identity. But wait, Hal T. Curtis of Glendale, California, would have Apple heat things up a bit: "Using Windows 3 is like making love through a blanket. Crawl between the sheets with a Mac!"

We're sure you meant spreadsheets, right, Hal?

Speak Up: What can John Sculley do to earn his salary this year?

Last year, Apple CEO John Sculley received $2.25 million in salary for services rendered to Apple Computer, making him the best-paid executive in the computer industry.

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LETTERS

Don't Trust Anyone '030

I knew that Macs were intelligent, but this is absurd. My wife just came in with a Mac price list and told me we should get a new Mac — my old model-T Mac died minutes later.

Now I've got a dilemma. Pluses and SEs are a micrometer from obsolescence; and SE/30s, along with IIs, use 68030 chips that may soon go the way of vacuum tubes, unless Hitachi and Motorola kiss and make up and drop their cross-lawsuits over 60830 chip technology [*See Newsline, July '90, page 47 for details on this suit — Ed.*]. They will, won't they? They aren't that stupid, are they?

OK, they've already proved that they can be that stupid. My question is: If 68030s are outlawed, will only outlaws have 68030s?

Edward S. Margerum
Salem, MA

A Friend Indeed

I've been a loyal Apple user for the past five years and hope to continue using Apple products in the future. I'm not a computer wizard, but it looks as though the PC market is pushing the Macintosh aside. I'd like to know if it is still a safe investment to stick with Macintosh or if I should bite the bullet and join the PC market? I would appreciate any dirt you can give me!

Richard Earle
Washington, DC

C'mon, Rich, don't throw away five good years for the first flashy GUI package to run on a PC. You don't see Steve Mills (following letter) complaining — and he can't even afford to buy beer! — JB

Put Up or Shut Down

This letter is to everyone who has ever complained about the Mac. Why don't you just shut up and take the time to think about how wonderful the Mac really is? Would you rather be using an IBM PC? Why would anyone in their right mind want to learn hundreds of command names? And why would anyone want to use a copy of the real thing? I'm talking about IBM's "alternative" user interface, the one that works *like* a Mac. You know, those ugly windows and huge mice?

You can't afford Apple's prices? Well, just try bringing your lunch to work instead of eating out — and stop drinking all that beer. I bought my SE, printer, modem, and truckloads of software on the salary of a student (none) who worked weekends (not much). Now it's paying for itself. It makes money for *me*. And the damn thing is still just as courteous and gracious as the day I took it out of its box.

Steven J. Mills
Coralville, IA

By the Numbers

It's very frustrating when a magazine fails to print a page number on each page. In your March issue, for instance, only 113 out of 292 pages (39 percent) show numbers. Your magazine obviously isn't the only example, but it's my favorite, so that's why I've written. What's the story, guys?

Glenn R. Holland
Glebe, Australia

With such a bent for statistics, it's a shame you live in a country without major-league baseball. Seriously, the production and financial considerations that go into something that seems as simple as page numberings are mind-bogglingly complex. Suffice it to say, we aren't deliberately trying to make it hard to find things. — JB

Cross Purposes

I hope that you'll make the crossword puzzle you had in the April '90 issue (page 318) a regular feature. I've waited until now to write in the hope that it would be.

Not only was the puzzle fun and funny, but it was informative as well. Please think about making this a regular feature. It will guarantee that readers will want to see the next month's issue.

Consuela H. Allen
Rockville, MD

Sorry, the crossword puzzle was a one-shot deal. But if you're looking for challenging MacUser *puzzles each month, how about trying to calculate the exact percentage of pages with and without page numbers? — JB*

Can't Keep a GUI Mac Down

Journalists in the popular press have lamented the death of "the Macintosh difference" at the hands of Microsoft Windows 3. What disturbs me is that writers appear to be under the misguided conception that a GUI was all that distinguished the Mac from its competition — that the addition of windows, icons, and a mouse to any other machine makes it a Macintosh clone.

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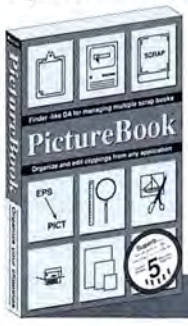
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LETTERS

the difference I refer to is one consisting of the standardization of application interfaces; a structured, five-level development platform that makes the integration of new printer drivers, network protocols, and System resources a comparative breeze; and yes, a rich, fully functional graphical user interface that spans *all* Mac applications and still operates successfully on a four-year-old, 8-megahertz, 68000-based Mac Plus.

Robin Gridley
Pasadena, CA

Up and ATM

In my ignorance as a new Mac user and nontypographer, I'm still trying to understand Thom Hogan's statement ("Font Basics and Beyond," July '90, page 231) that "If you're an ImageWriter owner, you can pretty much ignore Adobe Type Manager (ATM), since it really doesn't offer you much."

It's pretty clear to me that ATM offers *substantial* improvement, even when only 10- and 12-point Roman styles of each bit-mapped font are installed. I spent a lot of time with MasterJuggler, ATM 1.2, and the Font/DA Mover trying to prove Hogan's statement, but I couldn't bring myself to believe that the non-ATM output was even close, except in one or two font styles.

Howard McCollister
Crosby, MN

I received several letters from ImageWriter/ATM users. One even sent me a four-color, TypeStyler-enhanced missive that was, indeed, pretty impressive. Perhaps I should have worded my statement as follows: "If you're an ImageWriter owner, ATM will print nicer-looking characters but will impose several penalties in exchange for a modest improvement over the best of the bit-mapped fonts."

The penalties are price, speed, screen readability, odd character spacing with some applications, the need to purchase and use expensive Type 1 fonts, and burdensome memory requirements. The only significant plus is better character-by-character Type 1-font output, especially at odd sizes and with emphasis (bold, for example).

Version 1.2 of ATM, which I hadn't yet seen at the time I wrote the article, does seem to do a better job with the ImageWriter than the version I looked at. — TH

Color Traps and Pitfalls

Your article "Prepress: Cures for Poor Registration," (July '90, page 175) was very good. However, the key sentence is "You can use a Macintosh and an imagesetter to sidestep traditional prepress work and print pages directly to film." Sure you can, but do you really want to? For the unaware, there are pitfalls.

1. *Cost.* Because the professional illustration packages don't provide a dialog box for setting the desired trapping, this must all be done by hand. For many designs, traditional prepress work is actually less expensive.

2. *Time.* Customers have a tendency to change things up to the last minute (when it's in print), so it's not a good idea to trap too early. Unfortunately, that means you won't have time to trap correctly.

3. *Color quality.* To get the right colors, the service bureau must carefully calibrate and monitor the film's dot densities. Changes in chemistry can affect the dot density of the separations and thereby your final color output.

4. *Responsibility.* When printers do the prepress work, proper colors and registration are their responsibility. Printers have a much better idea than illustrators do of how much trap the paper and press require. If the prepress work is done by the illustrator, responsibility for proper color and registration shifts to the illustrator and service bureau.

Unless you can show a substantial cost savings and have resolved the other points through established work, you're better off doing the work on the Mac and having the prepress done traditionally.

Debbie Bautista
Wilmington, DE

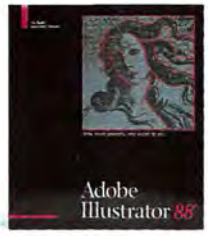
Thanks for a great section on color prepress. I'd like to clarify one small item, though, concerning the statement that QuarkXPress and PageMaker 3.02CE and 4.0 "correctly apply all the traps in imported FreeHand or Illustrator images" (page 178).

It's been my experience, as a graphic-production manager and service-bureau operator, that EPS files created in FreeHand (2.02) or Illustrator 88 (1.9.3) that use separate fill and stroke overprints do not retain these separate overprint specs when imported into PageMaker or QuarkXPress but instead use the global color specs. I do hear that QuarkXPress 3.0 will have some trapping controls built in, and I look forward to seeing this in

PUZZLES FOR PROGRAMMERS, #1.

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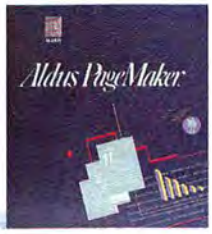
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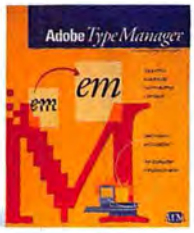

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LETTERS

action, especially if it corrects the previous situation regarding EPS files.

Regarding the final paragraph about importing EPS photos into FreeHand or Illustrator and then exporting them as EPS again: Although this is theoretically possible, results at our service bureau indicate that EPS files within EPS files are *very* troublesome to print, taking too long or not printing at all.

Jungle Payne
Santa Barbara, CA



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System 7-Celibate

Not only do the new people at Apple not know their products, but they also do not know their customers. They seem to think that the only entities that buy their products are large companies with interconnecting networks and unskilled operators. System 7 seems to be optimized for this case at the expense of all other users. They don't even know that the color monitor required to take advantage of all the System 7 features causes more operator fatigue (which is a contributor to low business productivity) than a monochrome monitor.

I've decided not to use System 7 and not to buy software that requires it. I'm going to coast with my present system (SE/30) for ten years and not buy any more Apple hardware that needs System 7. This ten-year figure is not all that preposterous when you consider that new IBM/XT clones are still being sold.

James Long
Sunnyvale, CA

Shhhhame!

I was struck by the juxtaposition of two of the headings over letters on page 11 of the July '90 issue.

It's ironic that the heading over Jim Everson's letter ("Reader and Adviser") would have been far more appropriate over librarian Jean A. Polly's letter instead of the stereotypical cheap shot you used.

You should know how far from library reality that facetious "Shhhh!" is (and how sensitive librarians are about it!).

Virginia Short
Sacramento, CA

Fax in the Box

It's quite interesting to see all the comments over the past few years about the box everyone is waiting for. In "Special Delivery" (July '90, page 12), Joel McCoy says he expects the Japanese to come out with a fax-copier-printer-modem-scanner in one box.

It should be obvious to anyone that

1. It is easy to build this box.

2. It will never be done.

Why would a company such as Canon build one of these when it can sell essentially the same hardware to a company three or four times? The Japanese limit competition enough and are dominant enough that they will never have to build this box.

The only remote hope is that perhaps a

LETTERS

Korean company will do it. And this is a very remote hope, as there has been a past case. I am speaking of video decks. The same situation occurred when about 10 million people realized that it would be handy to have a dubbing video deck for the home. Of course, the Japanese didn't build it. When a Korean company did, the Japanese froze it out of the parts market and it had to withdraw. Japan is now Korea's largest market and customer, so we probably won't see the magic one-box-does-it-all device any time soon.

John Elemans
Bellingham, WA

FUBAR Exam

I've just finished reading the August '90 programming column, "Under the Hood" (page 259), and am surprised to find the classic term *foo* defined as "a typically obscure name for a generic function."

Foo and its companion term *bar* are the syllables of the military acronym FUBAR (Fouled Up Beyond All Recognition; there is another word often used in place of *Fouled*, but *MacUser* is a family magazine) and are the two most commonly used generic variable or function names. Almost every college course in computer programming introduces its victims to these terms, usually without telling them how accurate and appropriate these names are for the code they are writing in the course.

I think the legion of *MacUser* readers who are discovering neat new ways to bring up the bomb box would appreciate knowing the true meanings of these terms.

Scott Forbes 70411,820
via Zmac

Most of them will probably be too busy coining colorful acronyms of their own, but thanks for the info. — JB

CLARIFICATIONS

"Spreadsheets to Go: Choosing a Spreadsheet" (July '90, page 162) contained incorrect mouse ratings for some products. The correct ratings (shown in parentheses) are Microsoft Excel 2.2 (5), Microsoft Works 2.0a (4.5), DeltaPoint Trapeze 2.1 (3.5), and Informix Wingz 1.1 (5). Also, the flowchart on pages 166 and 167 should have indicated that Wingz has a development language, not a macro language, and that it provides for dialog-box creation and screen control.

In "Networks: Under New Management" (August '90, page 226), we erroneously reported that version 1.0 of Neon Software's NetMinder Ethernet could not save or print collected network data.

The phone number for information on Microsoft foreign-language dictionaries (Help Folder, August '90, page 283) is no longer valid. The new number is (800) 426-9400.

The August '90 MiniFinders listing for Encore from Passport Designs was short one mouse. The listing should have featured the same 4.5-mouse rating that the program received when it was reviewed in May '90.

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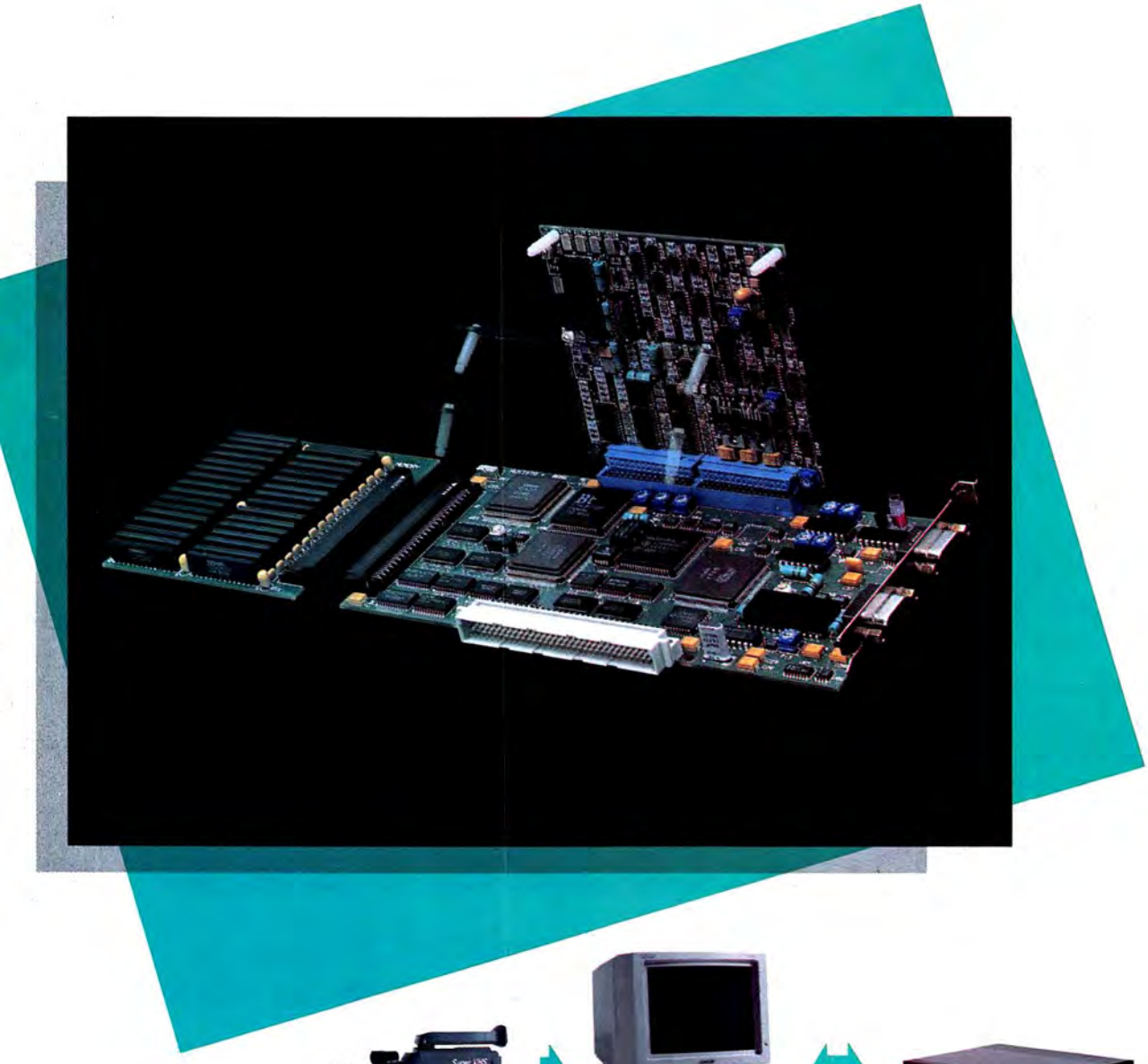
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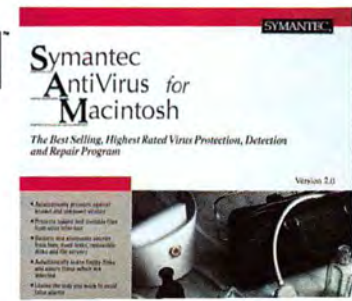
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PAUL
SOMERSON

Box Scores



By Paul Somerson

They say you can't judge a book by its cover, and I agree. After all, that's what dust jackets are for. Packaging — whether for the latest best-seller or the newest page-layout program — is too often an overlooked part of the process of buying or selling products. It includes much more than mere dust-jacket puffery or back-of-the-box boasting.

I can't begin to tell you how many times I've watched a good, or even great, demo of a new product, only to cringe when someone proudly displays the planned packaging. What poorly designed packaging says to me is that the developers haven't successfully communicated the product concept to the marketers, who haven't communicated it to the designers. That's got to make you wonder whether the developers and marketers themselves really understand what they're working on — or its market.

Packaging really starts when a product's developers first decide what it is and what it isn't that they're creating — whether it's a Stephen King blockbuster or a Bill Gates marketbuster — long before it ends up inside its dust jacket or three-ring binder.

Sure, crummy packaging might seem like an easy thing to fix, but it's symptomatic of more-serious problems. And everyone knows that the personal-computer market doesn't usually wait around for people who don't get things mostly right the first time around. At least, not unless your name is Apple or IBM — and even then, you're pressing your luck.

Speaking of Apple, didn't it used to be in the packaged-software business? Remember when every Mac was like Crackerjacks, with MacPaint and MacWrite as the prizes that came in every box? Then Apple spun off that business into Claris, a supposedly independent subsidiary. Apple continued to develop software, though, but tried to differentiate what *it*, as a company, created — System software — from what independent third-party developers, such as Claris, created.

Time passes. System software gets complicated. HyperCard becomes the new Crackerjacks prize, forcing Apple to speak with forked tongue: "Users, here's a great application to end all applications, and it's free! Aren't we a nice warm-and-fuzzy computer company?

"Developers, we're not competing with your flat-file databases, application-development environments, appointment calendars, organizers . . . naaahhh! *Those* kinds of products come in *boxes*. All *we're* doing is enhancing the System software. Aren't we a nice warm-and-fuzzy computer company?"

More time passes. System software gets even more sophisticated. Armed with an arsenal of INITs and cdevs, savvy users can create a System file so robust that they hardly need any application software. (Well, almost.)

More time passes. Claris begins acting truly independent and starts making noises about developing software for Windows 3.0, the Macintosh Finder's evil twin on the PC side.

Hardly any more time passes before Apple takes action — in an about-face, Apple decides that Claris will no longer be independent. Which leads some to wonder about the future of Apple's System software: Will it continue to be an unpackaged bundled product? Or will it be sold à la carte? Does Apple fear that HyperCard is looked down on because (unlike Plus, SuperCard, or HyperCard's PC-based counterparts) you don't have to pay for it? What about Apple's font technology (free) versus Adobe's (for sale)? Is one of the secrets of the success of DOS, Windows, and other PC operating systems the fact that you have to pay for them, automatically entitling them to a certain measure of respect?

I don't think so, but to explain why, I have to divulge one of the Big Secrets of the microcomputer industry. (So you have to promise to immediately zap your PRAM after you read this next sentence.)

Here's the Secret: Macs, IBM PCs, NeXTs, Suns, and most of the other big names in the personal-computer business aren't really what the makers of those machines are selling. They'll gladly sell you the box, but what they're really selling is the *software*. In Apple's case, it's selling System software. In IBM's case, it started selling PCs as a way to keep its "big iron" customers happily shelling out the bucks for IBM mainframe software and support.

The point is, the hardware box with the multicolored apple is not all that fundamentally different from the box with three blue-striped letters. Inside either box, you'll find a CRT (or a way to hook up a separate monitor box), a power supply, a Winchester drive, a floppy-disk drive, a keyboard, and a mouse. Even the motherboards have more similarities than differences. The more profound differences lie in the operating-system software. Although the differences may be less significant than the similarities, as with Coke and Pepsi, Toyota and General Motors, or men and women, it's these differences — rather than the similarities — that we focus on.

From the manufacturer's

There's a Crackerjacks prize in every Macintosh computer — System software — and it's a prize that's worth paying for.

point of view, the box costs only a few hundred bucks to make. The difference between its cost and what you pay is, in a sense, a royalty for the System software. Of course, as all the boxes cost about the same to produce, that difference — the royalty — can vary from only a few hundred dollars (if you're buying an SE) to several thousand (if you're buying, say, a IIfx) for exactly the same System software. But the IIfx box can do more with that software than the SE box can, so IIfx customers are willing to pay more. Econ 101, remember?

As software is what really brings in the big bucks, it shouldn't be surprising that Apple wants to bring Claris back under its thumb — not so much for the revenue from Claris' application software but to keep that competitive advantage out of Apple's competitors' hands.

What does all this mean for customers? Here are a few predictions:

• Apple will continue to give HyperCard away (for the foreseeable future) but will sell Claris-labeled HyperCard add-ons to compete against the extended functionality of Plus, SuperCard, and (on the PC side) ToolBook.

• Some aspects of System software currently under development — perhaps even parts of what once was intended for inclusion in System 7 — will be shuffled off to Claris to be transformed into commercial products that will compete with utilities such as font managers and macro languages.

• Claris' focus will eventually be split into two areas: application software and System-level technologies that complement Apple's interests (such as interapplication communication, interplatform communication, and multimedia).

• Personal-computer buyers will continue to happily pay a premium of hundreds, or even thousands, of dollars per machine for their "free" System software. Don't get me wrong: Apple isn't scamming us. The retail prices for Macs aren't all *that* exorbitant. And when people argue about how Apple should sell Macs for less, they're missing the point: The question is not whether Apple could sell Macs for less — it's whether it could support System-software development in the style to which we've all grown accustomed if it sold Macs for less.

• "To Claris someone" will become a buzzverb throughout Silicon Valley, meaning "To yank the rug out from under anyone whose attitude reminds you of Bart Simpson's."

So the next time you're tempted to discount the importance of packaging, remember that this battle of the boxes might determine which operating system you'll be using in the future.

And the winner of this boxing match ain't decided yet.



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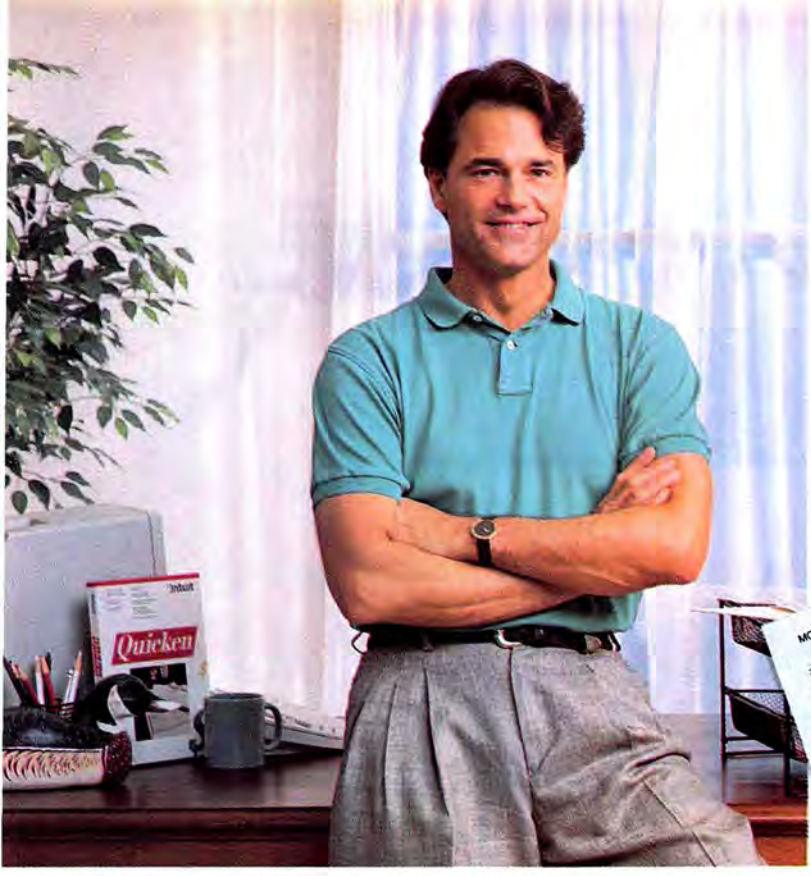
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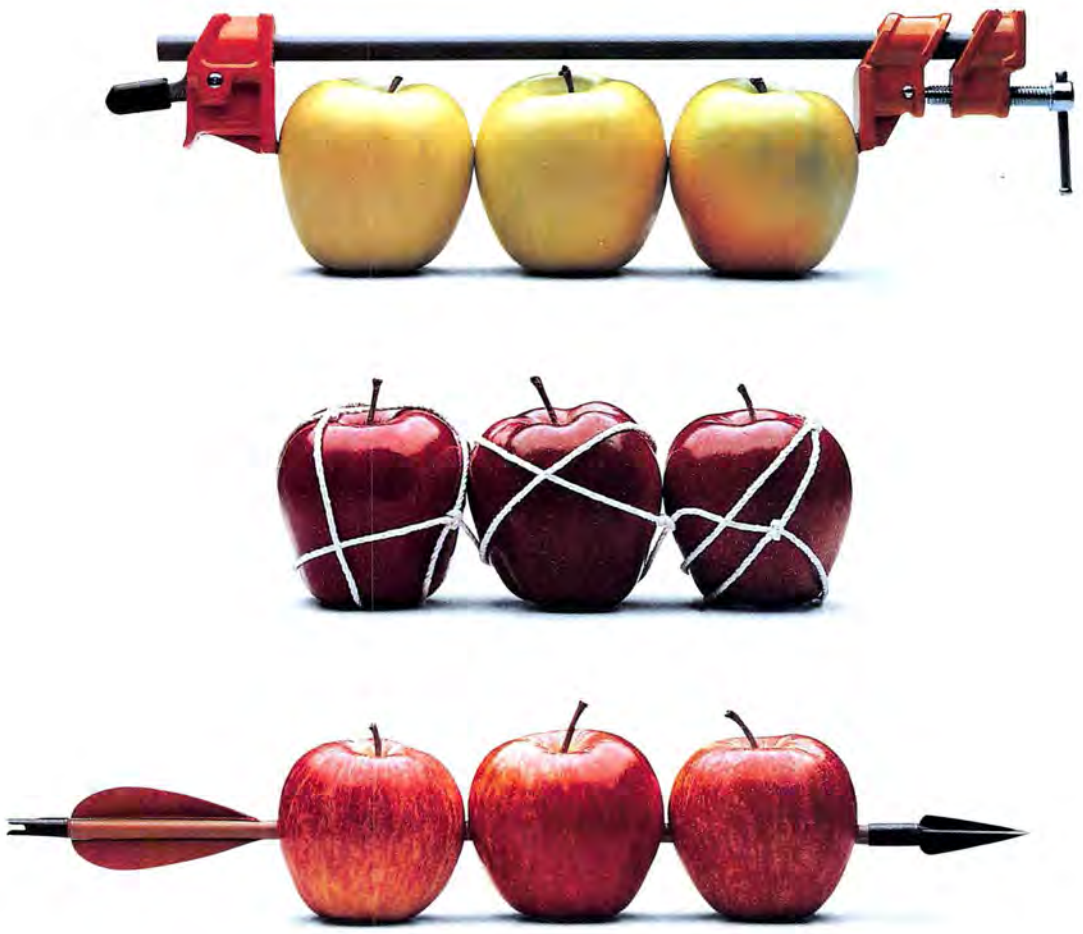
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ROBERT R.
WIGGINS



Gooeys and Me-Tooeys

Unless you've been off the planet for the past six months, you've heard more about Windows 3.0 for the IBM PC than you ever wanted to know. In fact, if you took all the words written about Windows 3.0 and strung them together, they still wouldn't make much sense, because so much hyperbole has been mixed in with the real information.

The DOS defenders have long sought ways to stave off the Mac attack, which began as a trickle and turned into a steady stream pouring into business. Now, some of them think Windows 3.0 is the weapon they've been praying for, and the DOS crowd has been brandishing it like a cross before vampires, chanting "Death to the Mac!"

Even some stock analysts picked up the refrain, and Apple stock fell as a result. But, like much of the hype and hoopla, the case has been overstated. Yes, Windows 3.0 provides a pretty good GUI (graphical user interface, pronounced "gooey"). And yes, it means some potential Mac sales will be lost to PCs running Windows.

But the Mac will endure. Windows 3.0 brings not death to the Mac but extended life to the PC.

DOS is old. Ancient in computer terms. It's been around since the birth of the PC in 1981 and existed even before that in its larval stage, CP/M. And although DOS has gone through many changes, it remains good old DOS to the core.

Microsoft hopes OS/2 will supplant DOS, but OS/2's bulkiness and substantial system requirements have slowed its acceptance. So Windows provides a viable alternative, a bridge between the old DOS and the new OS/2.

The problem Windows 3.0 presents to Mac users doesn't spring from its being a Mac killer but from Windows' being so derivative. In fact, Apple and Microsoft spent some time in court arguing about possible copyright infringement.

You could assert that Apple didn't have all these ideas first either. But the Mac was undeniably the first mass-market computer to use a GUI (as the DOS dedicated insist on calling it), and the Mac started a revolution. People who had never considered a computer before bought Macs and loved them.

The Mac's GUI enabled computer novices and illiterates to lay a hand on a mouse and become almost instantly productive. Moreover, the consistency of the interface meant that what they learned in one program they could use in another.

When you've finished using an application, you know exactly what to do to get out of it, because it's the same in 99.9 percent of Mac applications: Select Quit from the File menu. And when you see a gray bar to the right of the window with arrows at either end and a little elevator, you always know you can get to more information by clicking on the bar. Consistency and simple visual clues make the Mac interface a very powerful GUI indeed.

Now along comes Windows 3.0, and a lot of people are ready to relegate the Mac to the scrap heap of technology. Why? Not because Windows improves on the Mac — working five minutes with Windows would convince any knowledgeable user it doesn't. No, they're ready to trash it because Windows runs on IBM PCs, which makes it potentially cheaper (if you buy clones), faster (although few people have seen the 50-megahertz 80486 machines that the DOS dilettantes use for this argument), and more standard (they've been waiting a long time to trot the "standard" argument back out). Never mind that many of the same arguments DOS dilettantes used against the Mac in its infancy now hold true for Windows – such as the lack of software.

Of course, Windows *should* have many of the early Mac's drawbacks, because Windows is derivative. It doesn't improve on the Mac interface — it just gives you a me-too GUI you can run on other platforms. There have been other attempts to do this over the last five years, but Windows 3.0 is the first one good enough to merit discussion.

And while everyone argues about Windows' impact on the Mac, they're missing the real point: This industry has become a bunch of me-tooeys (rhymes with GUIs). Innovation often takes a back seat, while imitative products are used to bolster the bottom line. And judging from the reaction to Windows 3.0, that's what most industry analysts see as good strategy. Microsoft is being hailed for a product that's a knockoff of an innovative product that is now being vilified.

The microcomputer industry has a long history of this type of behavior. Company A produces an ingenious new product that excites the marketplace, often creating an entirely new product

Although the Macintosh isn't endangered directly by derivative products such as Windows 3.0, product innovation is.



BY ROBERT R. WIGGINS

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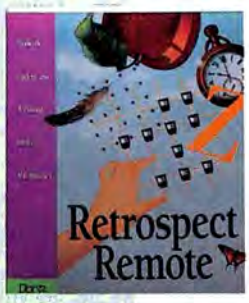
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category. Once the product is firmly established (sometimes even as a "standard"), along comes Company B with a clone that doesn't require the innovation and research-and-development expense that Company A has to recoup.

So Company B's knock-off usually costs far less and drives Company A's product out of the marketplace. To be fair, sometimes Company B's product improves on the original, and Company A just falls by the wayside. But often Company B's product is not superior, and this is where the consumer can get cheated.

In the new corporate Darwinism, creativity is not being selected. In fact, the reverse often holds true. Companies with me-too products often do better than the makers of the originals. Penny-pinching buyers pass over products whose pricing reflects their creators' need to recoup R&D costs.

The gutters beside the high-tech road are littered with ground-breaking products (and sometimes companies) that couldn't withstand the competition of copycats. CP/M and DOS. VisiCalc and Lotus 1-2-3. MacPublisher and PageMaker. The IBM PC and its clones. The Lisa and the Macintosh. WordStar and every other word processor.

Fortunately, not every attempt at cannibalizing someone else's market succeeds. Lotus 1-2-3 has fended off many competitors, and only the more innovative Microsoft Excel (primarily due to its GUI) has given 1-2-3 any real competition. PageMaker has remained at the top of the heap by continual revision. The word-processor wars actually aid consumers, as each player concentrates on adding new features to its program in a war of leapfrogging innovation.

What the computer industry needs is more GUIs and fewer me-tooeys. Users should encourage creativity and not hastily abandon the innovative products and companies when the next wave of copycats comes along.

And don't start singing dirges for Apple just yet. If DOS has been able to hang on for ten years, surely the Mac can make it at least until 1994. By then, perhaps, some of the millions Apple has been spending on R&D will have borne fruit and the copycats will have to start all over again.



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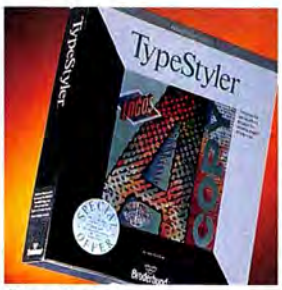
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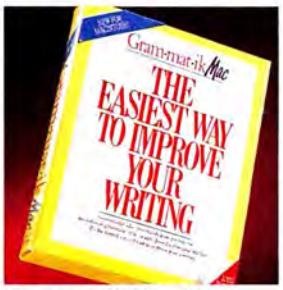
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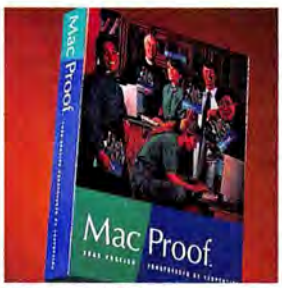
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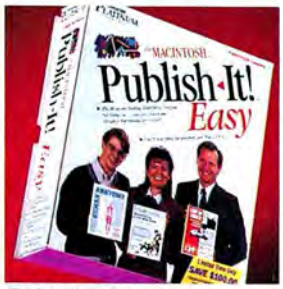
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Gemini Accelerators .... see listings pg 7

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GemKit (allows user to put Gemini 020/030 Accelerators in Mac+, 512kE, 512k, & 128k. Includes internal fan, SCSI port, and space for extra RAM memory) ..... 149.

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4½

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The Singapore Way

I've decided temporarily to stop evangelizing Macintosh and transfer my energies to a new cause: Singapore. I decided this during my visit to the Singapore Macworld Expo, sponsored by the good people at Diversitec, an Apple distributor in Singapore. This column is dedicated to convincing you to try the Singapore Way.

The Nordstrom of Airlines

Even before you arrive, you get an inkling of the Singapore Way if you fly over on Singapore Airlines. Beth and I experienced less stress on our 20-hour flight from San Francisco to Singapore via Hong Kong than on 3-hour flights to Chicago.

This is the Nordstrom of airlines: We got six hot towels during the trip. For the first time, I got off a plane cleaner than when I got on. Although, frankly, we were in no rush for the plane to land. If Singapore Airlines ever makes a computer, we should all switch. I'd rather have a Singapore Girl than a Knowledge Navigator running my computer.

The TLC we received in the air continued after we landed in Singapore. First, we ripped through customs faster than a Macintosh IIfx can open windows. Then we were picked up at the airport by a Rolls-Royce.

I was puzzled by the fact that its rear end was dragging until I discovered that the Rolls was hauling a Macintosh Portable in its boot. Fortunately, the Rolls was air-conditioned. This counts for a lot in Singapore, because in contrast to America, where you have to pay for a steam bath, there you just have to go outside.

A Little Background

Singapore gained independence from Malaysia only 25 years ago. In that time, it has certainly kicked butt — its standard of living is second only to Japan's in Southeast Asia. Arguably, in many areas, it has accomplished more than the U.S. has in 200 years, Europe in 2,000 years, and Claris in 2 years. (Any similarity with Claris ends quickly, however, because there's no way that Malaysia is going to be able to buy Singapore back.)

The prime minister of Singapore is Lee Kuan Yew. He seems to be the quintessential evangelist, because he has sold the people of Singapore on the dream of a high standard of living. If he were president of Apple, in 25 days, Apple would be bigger than IBM and Cupertino would be a separate country.

Singapore is clearly an Asian country that's run like a company. (Apple, by contrast, is a company that's run like an Asian country.) Some people would counter that Singapore is a benevolent dictatorship and semipolice state. On the other hand, what do you think our lives would be like if Microsoft got any more powerful?

Macintosh in Singapore

The attitude toward Macintosh is delightful in Singapore. Singaporeans have been inculcated with the Macintosh dream of improving creativity and productivity with Macs. While hanging around the Expo and speaking to a Macintosh user group, I noticed that the questions, comments, and concerns about Macintosh are as progressive there as anywhere I've been. In fact, very few people are jaded about Macintosh the way many Americans are.

The Expo was held in the Raffles Convention Center — a combination hotel, shopping mall, and convention complex. The show was smaller than a Boston or San Francisco show but incredibly well run — for example, there were battalions of people making high-quality badges, and the air-conditioning was flawless. The exhibitors were a combination of U.S. companies who had sent U.S. personnel on a boondoggle (an Aldusian shall remain nameless here) and local developers. In all cases, the booth personnel's product knowledge was incredibly high — much higher than that of the typical Trixie-and-Biff content-free booth personnel we're used to.

We'd all be better off if Apple — or America, for that matter — were run more like Singapore is.

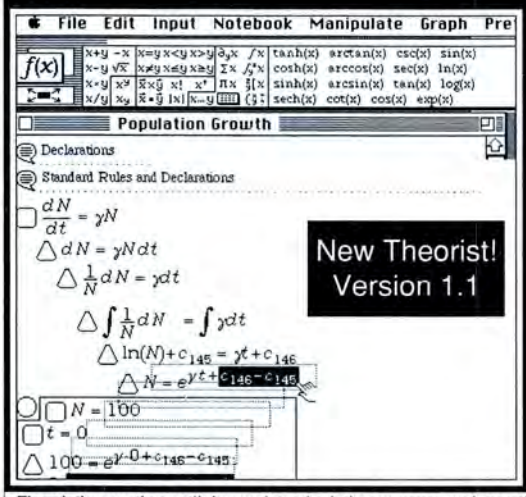


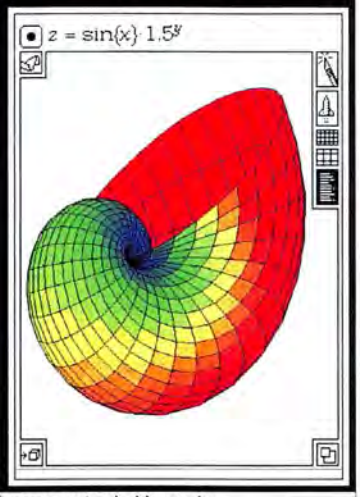
By Guy Kawasaki

The Singapore Way

Let me get back to raving about non-Macintosh aspects of Singapore. First, I loved the people. This is, after all, one of the few places on earth where I

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KAWASAKI

can be the Ugly American *or* the Ugly Japanese. Singapore is a wonderful amalgamation of the Chinese, Malay, Japanese, Indian, and Arab cultures. In all my interactions with Singaporeans—from my hosts to cab drivers to restaurant personnel — I've never dealt with friendlier or more efficient people. It's kind of the opposite of Paris — or most Apple dealers.

Second, the food in Singapore is amazing. It's so good that even the clean restaurants are good. Many coffee shops in Singapore have better food than the best oriental restaurants in Silicon Valley. You won't get sick eating it, because there are strict regulations and inspections. And the food is cheap. Satay sticks cost $.20 Singapore per stick. That's about $.11 U.S. "Come for the Expo, stay for the food" is my new motto.

Third, Singapore is crime-free. I felt safer there than in lots of places in America. It must be because of the severity of punishment. For example, drug dealing is a capital offense. Drug possession gets you about 25 years and 20 lashes of a cane whip called a rotan. Smoking in public, failing to flush the toilet, littering, and jaywalking carry penalties of more than $100 U.S. each. It sounds severe, but the results are stunning. At the least, you've got to rethink the U.S. legal system.

Fourth, English is the official language, so communication is very easy. Unlike in France, where people who understand English pretend they don't, in Singapore people who don't understand English still try to. I grew fond of the Malay language, however, because it is extremely descriptive. I even learned to speak a little. The first word I learned is the Malay word for IBM PC owners. It's *kayn*. Literally it means wooden (really, no kidding). Its connotative meaning is someone who has wood for brains, if you know what I mean. Maybe I should move to Singapore and become the minister of computing. Then people who bought an IBM PC would get 20 lashes of a rotan. On the other hand, maybe owning a PC would be punishment enough.

Hey, don't take my word about Singapore. Test-drive it yourself. Go to next year's Macworld Expo, and charge the expenses to your company. ("Ask forgiveness, not permission" — that's my new motto.)



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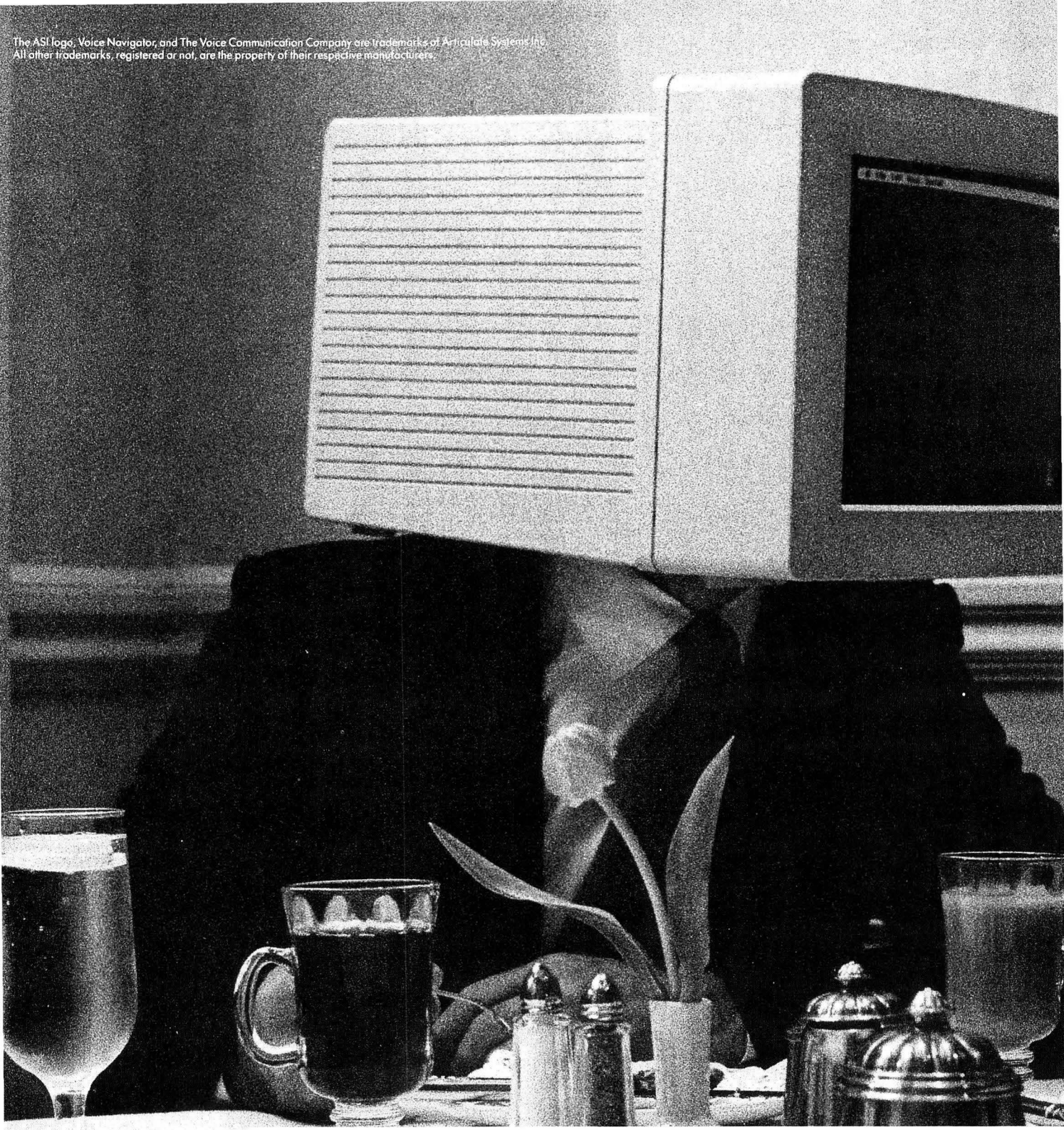
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It was 1984. The personal computer had finally become a personal computer.

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Apple's redoubtable Mac line is doomed by the marching millions of IBM PCs with their shining new Windows 3.0 interfaces — or is it? Guy Kawasaki lets you have it both ways this month.

By Guy Kawasaki

The Top 10 Reasons to Switch to Windows

10. So you can learn how to format disks again.



9. So you can help test the first versions of new applications.

8. So you can find out if an 80286 machine can really run Windows.

7. So you can see for yourself how little industry analysts know.

6. So you can give your Macintosh to your six-year-old kid to do desktop publishing.



5. So you can feel comfortable wearing a yellow paisley tie.

4. So that the money you would spend on Apple equipment isn't used to hire and terminate bozos.

3. So you can help pay for Bill Gate's underground mansion by buying Microsoft products.



2. So you can understand why Andy Hertzfeld, Steve Capps, Bill Atkinson, et al. may never be equaled.

1. Because you like waiting for software for your computer.

ILLUSTRATION JOHNEE BEE

The Top 10 Reasons to Stick with Macintosh

10. So you can continue to get great customer support from Apple.

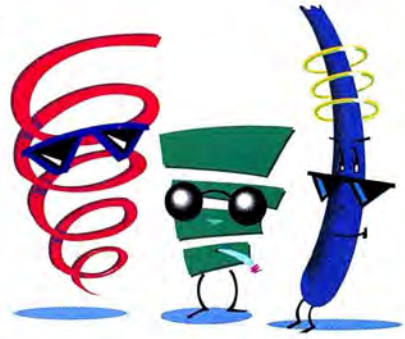


9. So you can help Apple debug System 7 — after it ships.

8. So you can buy a PostScript printer and help Adobe.

7. So you can continue to wear your BMUG tie-dyed T-shirt with pride.

6. So you can use the kind of software that Windows will have in two years.



5. So you can help send the Knowledge Navigator on to college.

4. So you can keep your *MacUser* subscription and not have to suffer through smelly perfume inserts.

3. So you can be on the leading edge of cool viruses.



2. So you can help pay for Bill Gate's underground mansion by buying Microsoft products.

1. Because if Steve Bobker did Bobker's Dozen for Windows, it would last only one issue.

NewsLine

Reports and Analysis

APPLE REABSORBS CLARIS

CUPERTINO, CA — In one of the first tangible actions taken during the newly installed Michael Spindler regime, Apple Computer reacquired Claris in its entirety, turning the company into a wholly owned independent subsidiary. Apple had held an 80-percent share in the software company, and its purchase of the remaining employee-owned 20 percent preempted Apple's original plans for Claris' independence, which included public trading.

No changes are expected in Claris' product plans, although the company will be more involved in creating bridges for multiplatform environments.

ATKINSON SAYS 'ADIOS, APPLE'

CUPERTINO, CA — Bill Atkinson, the father of QuickDraw, MacPaint, and HyperCard, has joined fellow Apple alumni Andy Hertzfeld and Mark Porat in a new Apple venture called General Magic. Hertzfeld and Atkinson have each reportedly invested $1 million in the venture to produce a line of products Apple is calling Personal Intelligent Communicators.

Published reports have speculated that the units will be highly sophisticated videophones. Apple is a minority participant in the new company and holds the first nonexclusive license to manufacture and market the company's products.

ASHTON-TATE DUMPS DBASE MAC

TORRANCE, CA — Ashton-Tate has sold dBASE Mac — its first Mac product, which has been on the market for three years — to the New Era Software Group of Miami, Florida, which plans to upgrade the product and take over support for all current users.

MOTOROLA AND HITACHI REACH ACCORD

SCHAUMBERG, IL — Under pressure from a U.S. District Court ruling that ordered a ban on the sale of Motorola 68030 microprocessors — the heart of the Macintosh line — Motorola and Hitachi have reached an out-of-court settlement in their fractious patent-infringement suit. Although no terms of the settlement have been made public, the tentative agreement apparently ensures that deliveries of the 68030 will not be disrupted.

Bobker's Dozen

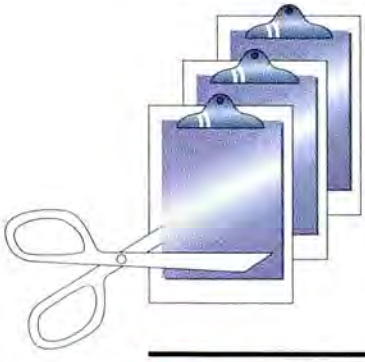
By Steven Bobker
Bobker's Dozen, c/o *MacUser*
950 Tower Lane, 18th Floor
Foster City, CA 94404
Your suggestions, comments, and products for consideration are welcome.

1 MultiClip 2.0 ★★★★½

MultiClip 2.0 is a much improved version of an already good product that lets you have, in effect, many Clipboards. This makes many graphics and page-layout applications easier to use.

Performance, reliability, and compatibility are all noticeably better than in previous versions, and ease of use has been enhanced considerably.

This version also features a host of new features. The one I find most useful is the ability to name and see the names of each ClipFrame (MultiClip's name for its Clipboards), which makes finding a frame much easier. You can also select ClipFrames by name from a submenu. (For a rundown on the program's basic features and operation, see the review, September '89, page 82.)



Olduvai, 7520 Red Road, Suite A, South Miami, FL 33143; (305) 665-4665. Version 2.0. $129.

2 FastLabel ★★★★

FastLabel is a very good volume label creator and printer. It has excellent tools for designing labels, which can include graphics and icons. There's even a built-in icon editor.

The program includes a small but useful selection of positioning and graphics tools to enhance labels, which can have two typefaces, each in different sizes.

You can combine labels into templates to make best use of your label stock. And you can print envelopes by treating them as large labels. FastLabel's printing performance is very good. I used a LaserWriter IINTX and a DeskWriter and got equivalent results.

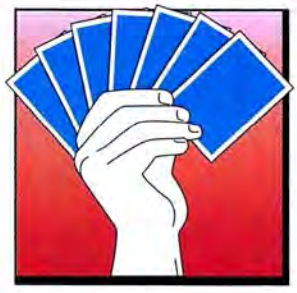
FastLabel's weakness is in its list handling. Only tab-delimited files can be imported, and only absolutely pure — that is, non-delimited — text files can be exported. Internal tools for list maintenance aren't powerful enough for users with lots of data. Vertical Solutions advises you to do list manipulation in a database that can export tab-delimited files.

Vertical Solutions, P.O. Box 7535, Olympia, WA 98507; (206) 352-2097. Version 2.0. $139.95.

3 Bridge ★★★

My college minor was bridge. Getting four players together has become harder as the years have passed. Bridge, version 6.0, can usually provide a friendly game, however — just don't expect to have good opponents.

Bridge wasn't originally designed for the Mac and doesn't support color or any of the niceties of the Mac interface. (For example, there are lots of modal steps to wade through.)



Bidding is usually reasonable, but the computer does have a tendency to overvalue distribution and rebid, repeatedly, truly awful holdings. You can make some of the impossible contracts, though, because the program isn't a real good card player.

Bridge is playable, and it's often the only game in town.

Artworx Software, 1844 Penfield Road, Penfield, NY 14526; (800) 828-6573 or (716) 385-6120. Version 6.0. $39.95.

4 Hyper Toolkit ★★★★½

Hyper Toolkit is a large collection of HyperCard developmental tools and XCMDs. Using these self-documented tools, you can easily add color, pop-up menus, fancy dialog boxes, and much more to your stacks. The tools are generally easy to use, and all of them work as the documents suggest. Serious HyperCard developers will want to have a copy of Hyper Toolkit around.

Many of the Toolkit's features come in a stack that you install. Following the simple installation process, a new menu with your options appears in HyperCard's menu bar. The larger XCMDs are separate, and you install them into your stacks manually.

The main drawback is the lack of hard-copy documentation. All the necessary details are there on-line, but having to scroll through to find the information you need is tedious and an ineffective way to document developmental tools. Simply printing them doesn't help, as parts are linked to other parts. It's a case of HyperCard being too good for its own good.

Shared Intelligence, 1001 Bridgeway, Suite 279, Sausalito, CA 94965; (415) 331-2061. Version 2.0. $99.



5 INITPicker

★★★★

An INIT and cdev manager is a basic power user's tool. As new INITs and cdevs multiply, conflicts become common. If you lack a good manager, Mac usage can degenerate into chaos.

INITPicker is one of the best INIT and cdev managers available. It offers all the basic functionality you'll ever need and lots more. You can drag INITs to the exact position in the loading-order chain you desire. Bomb Prevention, if enabled, automatically disables any INIT it catches conflicting with another one. There are audible as well as visual warnings and alerts.



INITPicker would be virtually perfect, except that you either have to set it to scan for new INITs every time you restart (a slow process for most people) or remember to manually scan and turn on newly installed INITs. That's a pain. I often forget to do it and then wonder why my new INIT won't load.

MicroSeeds Publishing, 7030-B W. Hillsborough Ave., Tampa, FL 33634; (813) 882-8635. Version 2.0. $69.



6 miniWriter 1.6

★★★★½

Back in the days when MacWrite could handle only one open document at a time, many of us got to know David Dunham's miniWriter very well. It was the only effective way to cut and paste between documents or to work on multiple files at the same time. Back then a handy DA text editor was a godsend, and miniWriter hasn't lost its luster.

miniWriter is the best note-writing DA, far outshining Apple's weak NotePad. Designed for dot-matrix printers (miniWriter has a custom font that looks unusually good when you use an ImageWriter), it prints very well on laser and inkjet printers too.

Features include the ability to convert plain quotes (") to the better-looking curly, or printer's, quotes ("") and the ability to remove curly quotes (necessary for much telecommunications work). The Find feature works well. You can set the typeface and size for the whole document but not for individual words. Only files in text format can be opened and handled. If you want fancy formatting, you have to use your word processor rather than miniWriter.

Overall, miniWriter has a slick feel and is easy to use. I've tried fancier text-editing DAs, but I always go back to miniWriter.

Maitreya Design, P.O. Box 1480, Goleta, CA 93116. Version 1.6. Shareware, $12.

7 HyperSpeller

★★★★½

The one utility that HyperCard has been missing all along is a spelling checker. Interactive spelling checkers, such as Thunder II and Spelling Coach Professional, check your work as you enter it into a text field, but they're no help in batch checking, which is usually what you require when creating a stack.



HyperSpeller adds this much needed feature to all HyperCard stacks. You can install HyperSpeller in any stack, and it checks the contents of text fields on all cards or any subset of cards. There's no way to check just a particular field on a card, however; all fields must be checked.

Installation is easy, and HyperSpeller's performance is excellent. Speed is more a function of HyperCard than of HyperSpeller (it's sort of slow). HyperSpeller uses the same Microlytics dictionary that MacWrite II and other applications use, so you'll be able to save considerable disk space if you already have it.

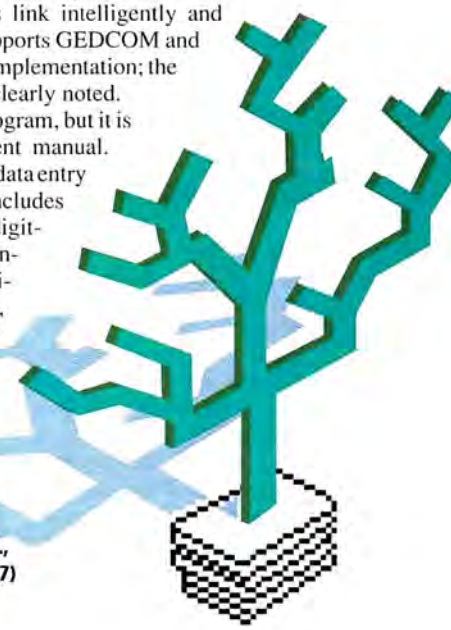
As a bonus, there's a Find/Replace XCMD that can be installed in any stack.

Foundation Publishing, 14228 Shore Lane, Prior Lake, MN 55372; (612) 445-8860. $49.95.

8 Reunion

★★★★½

Reunion is one of the nicest genealogy programs I've seen. Although it's based on HyperCard, it's so well done that you don't notice HyperCard's size and performance limitations. The various cards link intelligently and automatically. Reunion supports GEDCOM and most of GEDCOM's PAF implementation; the few minor exceptions are clearly noted.



Reunion is a complex program, but it is well served by its excellent manual. Using Reunion is easy, and data entry is logical. The program includes space and tools for adding digitized photos as well as an index and a birthdays file. Pedigree and descendant charts, which are too large for HyperCard, are created, displayed, and printed by a utility application called SuperChart. It works very well, printing out attractive charts quickly and with a minimum of fuss.

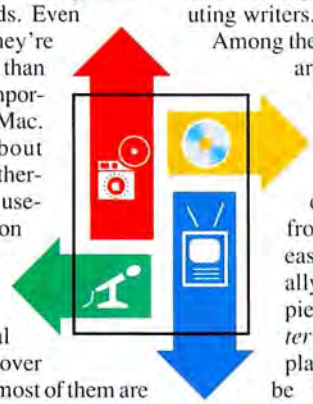
Leister Productions, 14 Hill Blvd., Mechanicsburg, PA 17055; (717) 697-1378. $129.

BOBKER'S DOZEN

9 Media Letter

★★★★½

Interactive media and multimedia technologies are complex fields. Even if you think they're more smoke than fire, they're important to the Mac. Learning about them and gathering specific, useful information has, heretofore, been an arduous task. Several publications cover this area, but most of them are written for the already knowledgeable and committed.



Media Letter is different. This monthly publication covers both basic and advanced material and seems aimed at users of these technologies rather than at developers. Denise Caruso is the editor—she's a superb writer as well—and she's assembled an excellent group of contributing writers.

Among the topics covered are the serious ethical issues the new media have exposed, application notes from differing areas, and some really good opinion pieces. *Media Letter* is a must if you plan to be or must be involved with multimedia and interactive technology. Even if you're not creating any multimedia projects yourself, you'll get something valuable out of *Media Letter*.

The Myriad Group, P.O. Box 5199, Belmont, CA 94002-9998; (415) 821-4737 or (415) 592-8900. $395 per year.

10 3-Meg Static RAM Card

★★★★★

Technology Works' 3-megabyte static-RAM card is an excellent, even necessary, addition to every Mac Portable. The static RAM uses no extra power and allows maximum operating speed. Many competing memory cards use low-power dynamic RAM to "fake" the effect of static RAM. In a side-by-side comparison, the Mac with the static RAM ran slightly faster and the battery lasted noticeably longer while in Sleep mode.

The card is easy to install, comes with an antistatic wrist strap to use during installation, and has a lifetime warranty.

Technology Works, 4030 Braker Lane W., Suite 350, Austin, TX 78759; (800) 688-7466 or (512) 794-8533. $1,195.

11 Number Munchers

★★★★★

Number Munchers is an educational arcade game. It's aimed at grades 3 to 12, and it teaches a variety of basic skills. The categories are multiples, factors, primes, equalities, and inequalities. Difficulty levels are infinitely variable and easy for parents or teachers to set and adjust.

Number Munchers can be used at home or in a classroom setting, in which the teacher's copy can serve as the master controller for all network copies.

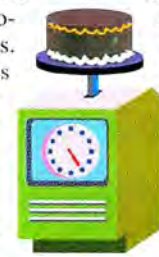
Play is reasonably exciting and will appeal to most students in the target age range. The easy levels are easy, and the hardest levels can challenge anyone. This program is a superb way to nurture children's math skills, but they don't have to know that. After all, why take the fun out of it?

MECC, 3490 Lexington Ave. N., St. Paul, MN 55126-8097; (800) 228-3504, (800) 782-0032 (in MN), or (612) 481-3500. $49.95.

12 Dietician

★★★½

Dietician is a good tool for people creating or monitoring special diets. Working from a list of 778 basic foods and their nutritional components, you build menus. You enter a recipe's components, and the program figures out the nutritional value of the number of servings you plan to eat. Dietician can also show diabetic exchanges, if desired.



The program is easy to use, although building menus takes an inordinate number of keystrokes and clicks. It doesn't have enough built-in food data for most people, but you can add up to 700 other items, if you can obtain the necessary data.

The data referenced in the manual is all fairly old, so you might want to update it (particularly the exchange data).

ALSoft, P.O. Box 927, Spring, TX 77383-0927; (713) 353-4090. Version 1.3. $94.95.



13 File Director

BETA!

File Director is the new name for two updated and upgraded classic utilities. The package contains the old Disk Tools Plus package, including a nicely improved version of the world-class Disk Tools Plus DA. The other major component is PowerStation, which is now also called File Director.

The File Director application offers only minor improvements over the latest version of PowerStation. Most of the changes are in the Disk Tools Plus DA, which is a serious rival to the top-rated DiskTop 4.0. Overall performance has been improved, and batch copies and moves are possible. Files can be marked so they're always easy to find. There's an excellent Find function, and you can change Finder file attributes such as locked or unlocked.

File Director also provides phone dialing, RPN (reverse Polish notation) and scientific calculators, and calendar DAs.

Fifth Generation Systems, 10049 N. Reiger Road, Baton Rouge, LA 70809; (504) 291-7221. Beta. No price yet.

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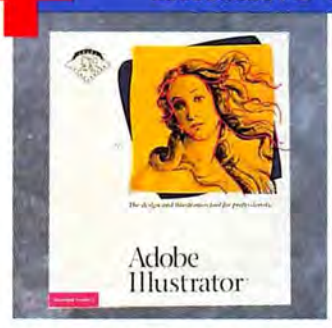
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COMPUTER COMMENT BY JACK LESAR, UNITED PRESS INT'L

"White Knight is one of the best values in communications software, and with Okyto thrown in (a $39.95 value when purchased separately), it's an even better bargain. White Knight continues the tradition of supporting every possible feature that its users could want and then some and with RCMDs you can add features even Scott Watson couldn't think of."

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MULTIMEDIA

Audiomedia

Kiss that studio goodbye: Audiomedia puts a CD-quality digital-recording facility on your desktop.

After years of development, the Mac has finally become the de facto medium of choice for professional audio applications and manipulation. In the forefront of this revolution are the products from Digidesign that turn the Mac into a self-contained, digital-recording studio.

Digidesign makes several interrelated products. At $995, Audiomedia is a more affordable version of the company's $3,285 flagship product, Sound Tools. Each includes a NuBus card and a software package called Sound Designer II.

The main purpose of both Audiomedia and Sound Tools is to record analog sound digitally in real time. You can play back, edit, and mix the sound files and subject them to a variety of special audio effects. The process is similar to using Farallon Computing's MacRecorder, but the sound quality is infinitely better.

Sound Tools takes a modular approach to sound and requires a separate analog-to-digital converter. It can be locked to SMPTE time code, whereas Audiomedia cannot. Audiomedia, however, has slightly better specs for sound quality, and the analog-to-digital conversion happens on the card itself.

Like most things in life, all this has a good side and a bad side: The good side is that Audiomedia needs only about 50K of RAM to run properly (although a 2-megabyte configuration is strongly recommended), thus leaving lots of room for MacroMind animations or other memory-intensive graphics that you may want to synchronize with the sound.

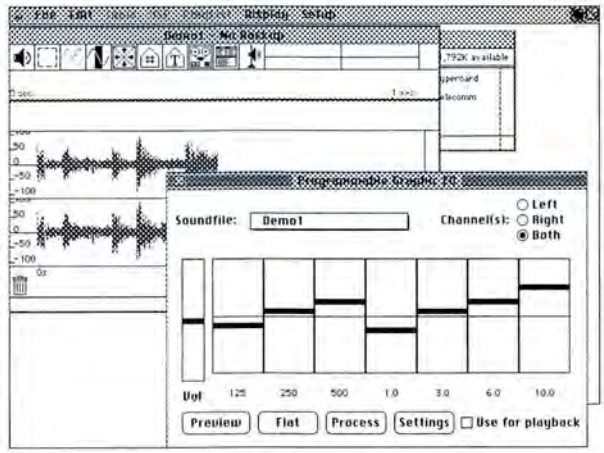
The bad side is that a typical sound file takes 10 megabytes of disk space per minute of sound. That's because the sampling rate is 44.1 kilohertz (the same as a CD's) and there are two channels of 16-bit sound for stereo. Contrast this with MacRecorder's 22-kilohertz 8-bit sound (slightly worse than AM radio). The penalty for Audiomedia's CD-quality sound is that it occupies huge amounts of hard-disk space. (MacRecorder records to RAM, not to the hard disk, which severely limits the maximum recording length.) Audiomedia also requires a hard-disk drive with a minimum access time of 28 milliseconds.

PRODUCT PROGENITOR Audiomedia has sparked a new industry. More than 75 third-party developers are now involved with Digidesign's products, one of the most notable being Opcode Systems. Working with Digidesign, it has come up with Studio Vision, an adaptation of Opcode's Vision sequencing program (see review, December '89, page 82). Studio Vision lets users integrate MIDI sequences with digital audio tracks and edit both simultaneously. Sound mixing and shaping are totally automated, as are the recording, editing, and playback of two independent digital audio tracks. Master the finished product to a DAT tape, and you've got an album that could be sold directly by the author, much as shareware is now.

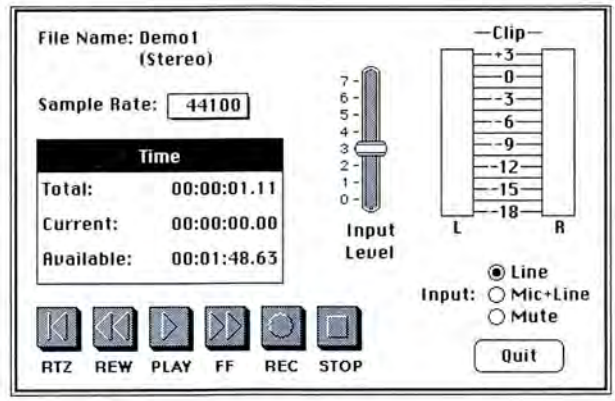
And for those who want to play these new digital sounds on the Mac directly from within applications, you can convert 16-bit stereo samples to the more familiar SND sound resource and have them play through a Mac's speaker.

Audiomedia's NuBus card has standard RCA jacks for inputs and outputs and a quarter-inch microphone jack above them. Because of space limitations, the RCA jacks' functions aren't identified, but once you get used to the setup, this isn't a problem.

The manual is definitely one of the package's strongest points. Not only does it guide new users through setup and trial runs, but it even has a chapter devoted solely to the theory of sound. Although I thought I already knew it all, I learned a lot. This chapter also contains a full discussion of the differing Mac sound-file formats. (Why should graphics people have all the confusion?)



Audiomedia combines software and hardware to turn your Mac into a digital-recording studio. The Sound Designer II software provides graphic control over sound through an easy-to-understand interface.



Turning on Audiomedia's recording functions is as easy as using a cassette deck. The different sampling rates give you the option of playing your recorded sounds on any Mac with no external hardware.

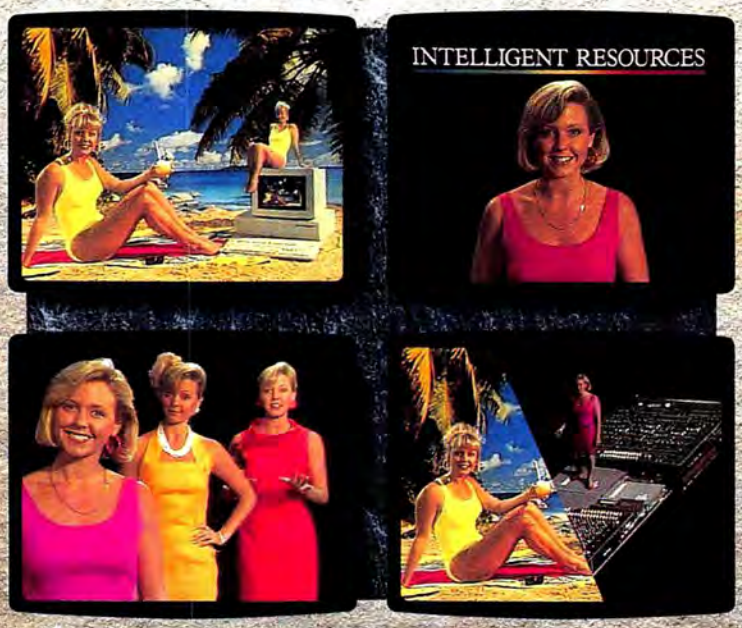
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Since the Video Explorer is a programmable 32-bit digital video engine, there's almost no end to the broadcast-quality effects you'll be able to achieve. You'll have full control of video processing: frame by frame, line by line, and pixel by pixel. You'll be able to perform fades, wipes, dissolves, and digital video effects.

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By following the tutorial section of the manual, I created a competent HyperCard stack within minutes, and I'm not a HyperCard expert by any means. (I did have some trouble creating new stacks but not modifying old ones or some of those that came with Audiomedia. When I changed my HyperCard version from 1.2.5 to 1.2.2, however, the problems disappeared. So much for progress.)

THE BOTTOM LINE For anyone who has ever wanted a high-quality professional recording system but couldn't afford $10,000 or more for a two-track digital recorder, I recommend Audiomedia. Whether you run a radio station, create audiovisual presentations, use sound in scientific research, or are just a musician with an ear for clarity, Audiomedia will more than fulfill your needs.

Considering the quality of the audio, Audiomedia is a bargain — especially for anyone who remembers shelling out several times that much for a reel-to-reel recorder that produced muddy tapes liberally laced with hiss.

— Ken Gruberman

Get Info

Audiomedia ★★★★★
Manufactured by: Digidesign, 1360 Willow Road, Suite 101, Menlo Park, CA 94025; (415) 327-8811.
Version: 1.2.
List Price: $995.

On DECK

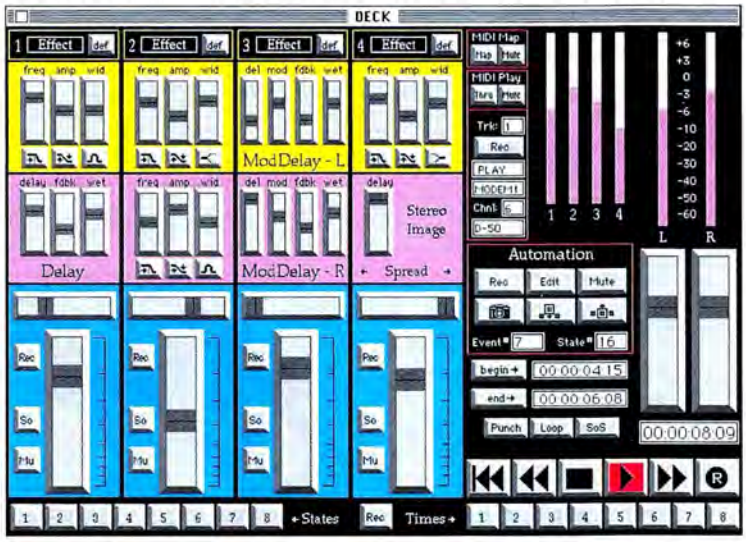
For the budget-minded, Digidesign has come up with a software version of the ever-popular four-track cassette recorders popularized by companies such as Fostex and Tascam. Called DECK, the software is a discrete four-track digital-recording, -editing, and -playback unit for the Mac. It uses the same technology as do Audiomedia and Sound Tools but costs only $349, although you must have either Sound Tools or Audiomedia to run it.

On-screen, DECK looks just like a cassette-deck and mixing console, and it works in much the same way — only without the noise! You can "ping-pong" tracks back and forth until the cows come home, and no noise buildup will plague you. You can also get DECK with a MacProteus card ($895), a NuBus version of E-mu's popular sample player. MacProteus has 32 voices and 192 presets. With MacProteus and DECK, you can become your own audio house and still have enough computing power left to take care of daily Mac chores.

Because the sound recording is being done inside a computer, there are things that DECK can offer that a four-track cassette recorder cannot, such as fully automated mix-down and equalization, built-in effects processing, and simultaneous MIDI-file playback.

With DECK's release, the days of the hiss-laden demo tape are numbered.

[As we went to press, Digidesign had just begun shipping DECK. We'll have a full review in one of the next few issues. — Ed.]



PRESENTATIONS

MORE 3.0

Symantec has turned an outliner into Persuasion's equal.

MORE started out as a humble outliner, and then evolution took over. Presentation software, a hybrid of structured word processing (a.k.a. outlining) and graphics emerged from the primeval software soup. Somewhere along the way, MORE acquired some of those genes, and they're far from recessive. In fact, MORE 3.0 can now match — and in some cases beat — Persuasion, the formerly undisputed top of the class.

MORE BETTER *MacUser*'s April '90 review (page 56) called Persuasion 2.0 ". . . simply the best in its class . . . ." At the time, I agreed. Now I'm not so sure. These two programs are in as close to a dead heat as any two I've ever seen. MORE has a richer feature set, but Persuasion's slide templates, especially the color ones, are better-looking. Of course, you can design your own templates, so the artistically inclined may find MORE's superior document capabilities, well, more persuasive.

As with Persuasion, the principal tool for getting your thoughts down is the outliner. In Persuasion, your outline-formatting options are limited — the outline is just fodder for slides. In MORE, true to its roots, the outline itself can *be* the presentation (with all the inherent pitfalls of text-heavy presentations this implies).

You have a wide choice of labeling schemes (Roman numerals, letters, bullets, and so forth), and you can customize new ones. If, for example, you maintain a to-do list in MORE, you can set its labels to be check boxes, so you can check off your tasks on a printed form as you get finished with them. Indeed, not only can you maintain a to-do list in MORE but the program also comes with a template for such a list, along with dozens of other templates.

Outline templates are stored in "libraries" you can load by choosing Open Library from the Library menu. The program comes with seven libraries, and you can create your own.

This is your hard disk severely fragmented

This is how a typical fragmented hard disk looks. The abuse fragmentation can deal is a crime, and it's causing a national epidemic in offices everywhere. But the more you use your computer, the more your files are spread all over your hard disk. As a result, your disk has to work a whole lot harder than it has to. And increased head movement not only slows down your file access times, it will slow you down, too.



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Even defragmentation software can't help much. Wimpy defraggers just place pieces of individual files adjacent to each other. Defraggers just don't have the intelligence to constantly monitor your file useage. So, any increases in performance are modest and only temporary, disappearing as soon as you use your computer again.



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■ *Frequently used files* ■ *Seldom used files* ■ *Free space*

Numbers & Letters are scattered pieces of single files

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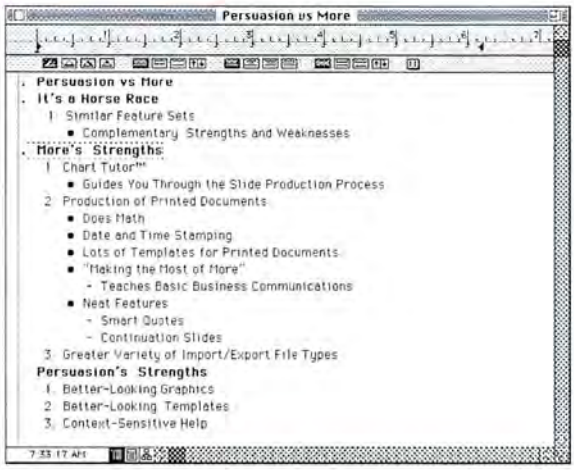
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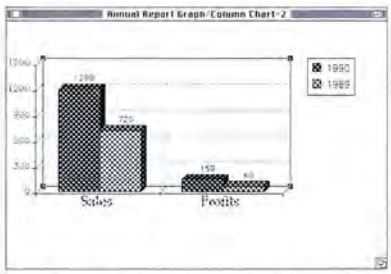
MORE started out as an outliner, but now it's a full-blown presentation package that can equal Aldus Persuasion, the former best of class. And the outliner is still top-notch.

Libraries contain more than just outline templates. They also contain objects, color sets, layouts, and rule sets. Objects are draw objects you can place in slides. The artwork is pedestrian, however, and if you need good art, you'll want to invest in a clip-art collection. Color sets are palettes of slide colors you can use in your slides. Layouts are like Persuasion's AutoTemplates; MORE's predesigned formats for slides (both 35mm slides and overhead foils) aren't as visually appealing as Persuasion's, though.

Rule sets are something else entirely. They're a way to format headlines (that is, any line in an outline) and comments — much as you use style sheets to format paragraphs in Word. But *much as* is the operative term; I couldn't figure out how they worked just by playing with them. The dialog box in which you edit rules is formidably arcane until you work through the tutorial and read the reference manual carefully. Once you understand rule sets, though, they're powerful tools.

The program's slide-making tools are also formidable. Slides are called bullet charts, to distinguish them from tree charts, the program's other display type. Tree charts are organizational charts on steroids. They have options for changing the way nodes are clustered; a staff tool for adding nodes that are not in the hierarchy; and as in bullet charts, complete control over colors, text, shadows, and the like.

Graphing is handled by a separate application, MORE Graph. It doesn't have any on-line help, but it's pretty easy to use. You import data or enter it into a worksheet, and in a few keystrokes, you've got a chart in one of nine styles. You can even combine different chart styles, and you can save customized chart formats.



MORE Graph is a separate application for creating charts that you can import into MORE's bullet charts.

THE BOTTOM LINE Symantec has turned a respectable tool into a true solution with two intelligent features. Chart Tutor, on the Bullet menu, guides you step-by-step through the process of creating your presentation. It's hard to screw it up. And a separate 92-page manual, *Making the Most of MORE*, teaches you not only the finer points of MORE but also how to communicate more effectively.

If you're currently using Persuasion, you probably won't feel a pressing need to switch. But if you're still shopping for a presentation package, you've got a tough decision to make. Persuasion is good, but you may find you want MORE.

— Tom Wrona

Get Info

MORE ★★★★½

Published by: Symantec, 10201 Torre Ave., Cupertino, CA 95014-2132; (408) 253-9600.
Version: 3.0.
List Price: $395.

MULTIMEDIA

RasterOps Video ColorBoard 364

Combining 24-bit color and live video, the RasterOps 364 is an excellent performer — and a terrific value.

Television is as omnipresent (and sometimes as annoying) as pollen in spring. TV is in our homes, it's in our air, and it's creeping onto our Macs. In less than ten months, *MacUser* has evaluated three devices for getting live video onto the Mac's display (from Mass Microsystems, Aapps, and now RasterOps) and has seen three more units (from Radius, TrueVision, and Aapps again). Of the three systems we've tested so far, the RasterOps Video ColorBoard 364 is easily the best.

SMOOTH AND SLIM The RasterOps 364 is a single-width, single-slot NuBus card that comes with three disks' worth of software. Unlike the Mass Microsystems ColorSpace IIi/FX system (see review, March '90, page 59), the 364 is easy to install and is no problem to get running. Because it's both a 24-bit display card (for the Apple 13-inch RGB monitor) and a live-video digitizer, you don't need a separate display system to drive your monitor. The 364's construction quality is excellent, with only a few visible wires

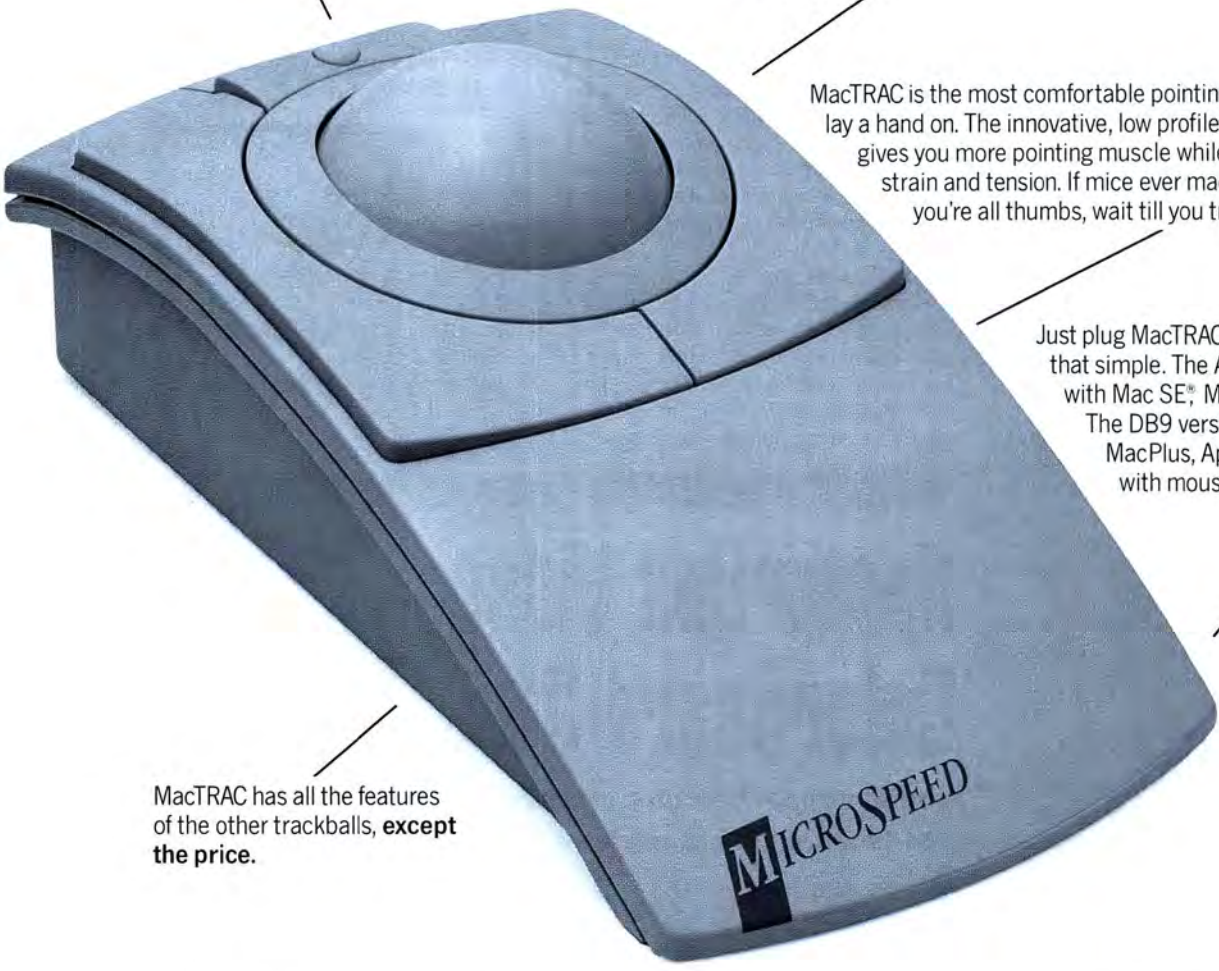
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that will probably be rolled into the circuit board in the next production run.

The 364 has only two video inputs: one RCA jack for composite NTSC and one four-pin DIN socket for S-video. It has no jacks for audio or NTSC out, but RasterOps was expected to start shipping two external boxes for NTSC output and an external ADB tuner shortly after press time.

The 364 comes with two programs for getting live video onto the Mac screen: a DA and an application. The DA, called 364 Video, has two interfaces: a resizable window with a colored title bar and a pseudo television set — complete with a simulated wood-grain cabinet.

The TV interface offers extensive controls for hue, saturation, brightness and contrast, and black-and-white levels plus direct control over the individual RGB signals, your choice of frame or field views (including selective viewing of the odd or even fields), speed control (full, quarter, or half), and video-source selection. You can also flip the image vertically or horizontally. The only significant missing option is a global "revert to original settings" — with all the available options, you can screw up the picture really quickly.

Frame captures require just a Command-key combination. You can choose whether to capture the current window size or the entire video image, and captures are saved to the Clipboard or to disk as 24-bit PICT files. It does not support multiple and timed captures.

The DA performed smoothly and well. Because the video is being displayed in 24-bit, however, system performance slowed noticeably. If you're displaying full-speed video, menus take forever to pull down. Because the 364 shares the same frame-buffer information as QuickDraw does, you can show live video without MultiFinder but the 364 seizes the frontmost window. As a result, menus and other QuickDraw graphics appear behind the video window. Because the menus are agonizingly slow with live video running, you'll probably stick to keyboard command equivalents anyway.

GRAB THAT IMAGE The other program for video display, FrameGrabber 3.0, is an application. It has two windows: one for video display and the other for viewing your capture. You can select random rectangular image sizes, make frame captures on the fly, and make multiple captures to memory or to disk. You can save sequenced captures made to memory in PICS format for export to MacroMind Director, and you can view captured images as 8- or 24-bit graphics and save them as 24-bit or 8-bit dithered color files. The application supports custom CLUTs based on selected image areas and lets you save captured files in PICT or TIFF format. Extensive color controls let you modify your captures, and you can resize the image however you want, but again there is no Revert command — once you've altered the image's proportions, you're on your own.



"The '88 Vote" courtesy of ABC News InterActive

The RasterOps Video ColorBoard 364 is a combination 24-bit-color graphics and live-video-display card. It's an excellent value that works smoothly. The 364 comes with software that lets you view and capture full-motion 24-bit video, through either a DA or an application (both shown here).

Some of FrameGrabber's other features include horizontal and vertical flipping, rotation (in 90-degree increments), RGB inhibition (by channel), color inversion, full- or half-speed display, and background display in MultiFinder. Background display slows your active applications to a glacial pace, and the video freezes if its window overlaps the application's. Because FrameGrabber's recommended MultiFinder partition size is 3 megabytes, it's pretty impractical to run in the background anyway.

FrameGrabber performed just as smoothly as the DA did, and my only reservations about it relate to its nonstandard interface. For example, it has a full-screen-display mode that centers a capture on the screen and sets everything else to black. (It's not a particularly useful feature, because you can show only one frame at a time.) You can drag the image around, but you can't cancel this mode with a click, a Command-period, or even a Command-Q. No, you have to use Return or Enter. Likewise, the grow box appears only when you hold the mouse over the video window's lower right corner — without experimenting (or God forbid, reading the manual), you might think the video window was a fixed size. Eternal vigilance is the price of a consistent interface.

THE BOTTOM LINE The RasterOps 364 is an excellent dual-purpose video board with very good software. RasterOps even tosses in some extras, including a HyperCard stack with video XCMDs and a set of X-Objects for MacroMind Director. The HyperCard stack doesn't automatically build a video application, but you can copy and paste the scripts. You can also create an extended desktop of up to 2,048 x 512 pixels (only 16 colors, however), and with RasterOps' pan and zoom software, you get a hardware/software equivalent of Stepping Out. At a little less than $2,000, the RasterOps 364 is an excellent value, and if you're not allergic to TV, it should take care of your video needs now and in the future.

A word of warning: Because of the huge amount of data being transferred, the 364 requires a lot of RAM and application performance can slow to a crawl. Running the 364 with memory- and CPU-intensive applications is impractical on machines with less than 8 megabytes.

— Russell Ito

Get Info

RasterOps Video ColorBoard 364

★★★★½

Manufactured by: RasterOps, 2500 Walsh Ave., Santa Clara, CA 95051; (408) 562-4200.
List Price: $1,995.

The products with

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1611 C.A.T. 3.0 ..... 289.

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★CheckMark Software ... 60 day MBG

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5862 Payroll 4.1 ..... 175.
5863 MultiLedger 1.3 ..... 235.

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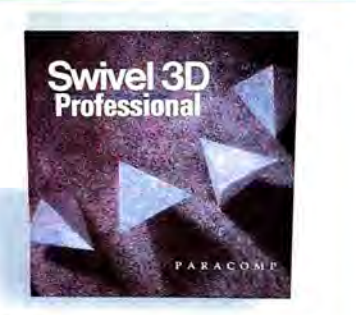
1129 MacWrite II 1.1 ..... 145.
4196 FileMaker II *(free upgrade to Pro)* . 218.
1125 MacProject II 2.1 ..... 365.

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7485 Desktop Help for Excel ..... 52.

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4955 Wingz 1.1A ..... 245.

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2425 Quicken 1.5 ..... 35.

★Layered ... 30 day MBG

5207 atOnce! 1.1 ..... 285.
2613 Insight OneWrite ..... 85.
Insight Expert Series ..... *ea.* 395.
2608 FrontDesk 6.10 Multi-User *(single)* .. 59.

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6382 The Microsoft Office *(CD-ROM)* ... 599.

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7680 Word on Apple Mac Book ..... 18.
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★Sensible Software ... 30 day MBG

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7692 Informed Designer . . . . . 159.

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★Survivor Software ... 30 day MBG

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7114 DigiVideo Color . . . . . 665.

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6053 Adobe Plus Pack. . . . . 109.
6156 Adobe Plus Pack/ATM. . . . . 159.
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6985 Adobe ATM/TypeAlign Pack . . . . . 89.
Adobe Type Set 1, 2 or 3. . . . . call
6931 Adobe Type Set 1 & 2/ATM Pack . . 145.
1137 Adobe Illustrator 3.0 . . . . . 349.
6644 Adobe Photoshop 1.0. . . . . 499.
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3507 Super3D 2.1 . . . . . 315.

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5425 Art Importer 2.0 . . . . . 89.
6499 Metamorphosis 1.5. . . . . 149.
1195 Fontographer 3.1 . . . . . 249.

Bright Star Technology

6093 interFACE 1.0 . . . . . 249.

Broderbund Software

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6281 TypeStyler 1.01 . . . . . 115.

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4707 Dreams 1.1 . . . . . 319.
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2621 Ready Set Go! 4.5A . . . . . 165.
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NEC
Image Gallery, Photo Gallery, Type Gallery PS *(CD-ROM titles)* . . . *ea.* 246.
6625 Clip-Art 3D *(CD-ROM)* . . . . . 246.
Olduvai
7120 VideoPaint 1.0 . . . . . 279.
PANTONE
7466 Process Color Imaging Guide . . . . . 49.
Paracomp
7421 DrawTools 1.0 . . . . . 62.
4597 Swivel 3D 1.1 . . . . . 295.
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★Somak Software ... 30 day MBG
7434 LaserArt CD-ROM Volume 1 . . . . . 62.
★Springboard ... 30 day MBG
3530 Certificate Maker 2.0 . . . . . 22.
4497 Top Honors 1.01 . . . . . 57.
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5625 PixelPaint Professional 1.0 . . . . . 389.
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4583 Images with Impact: Business 1 . . . 65.
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★Timeworks ... 30 day MBG
7115 Publish It! *Easy* 1.1 . . . . . 113.
5908 Publish It! 1.2 . . . . . 222.



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6370 Quick Art *(CD-ROM)* . . . . . 175.
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6740 StuffIt Deluxe 1.0 . . . . . 63.

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7422 FileGuard Office Pack 2.5 *(5 user)*. 349.
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★Berkeley Systems ... 30 day MBG
5737 After Dark 2.0 ..... 22.
1541 Stepping Out II 2.02 ..... 49.
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1511 Turbo Pascal 1.1 ..... 68.
★Bravo ... 30 day MBG
5404 SPAMM 1.1 ..... 48.
★Casady & Greene ... 60 day MBG
2269 QuickDEX 1.4D ..... call
7443 A.M.E. 1.1 ..... 159.
7444 A.M.E. 1.1 *(5 user)* ..... 509.
★CE Software ... 60 day MBG
4689 MockPackage Plus Utilities 4.4 .... 31.



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6122 Virtual 2.03 *(for Mac II, incl. PMMU)* . 188.
★Dantz Development ... 30 day MBG
5255 Retrospect 1.1 ..... 148.
★Digitalk ... 60 day MBG
5166 SmallTalk/V Mac 1.1 ..... 124.
Dubl-Click Software
1824 Calculator Construction Set 2.05... 45.
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3955 Suitcase II 1.2.6 ..... 49.
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7459 CarbonCopy Mac *(Single, 2 req.)* . 117.
7465 CarbonCopy Mac *(Twin Pack)*.... 169.
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2913 Redux 1.62. ..... 49.
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★Now Software ... 30 day MBG
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★Somak Software ... 30 day MBG
5897 ScriptEdit 2.0 ..... 49.
7430 SharpenUp 1.0 ..... 62.
★Spinnaker ... 30 day MBG
6692 PLUS 2.0 ..... 115.
★SuperMac Tech. ... 60 day MBG
3383 SuperSpool 5.0 ..... 58.
3382 SuperLaserSpool 2.02 ..... 87.
3378 SuperLaserSpool 5-Pack 2.02 ... 289.
3377 DiskFit 1.5.1 ..... 58.
3379 Network DiskFit 1.5 ..... 225.



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5724 Symantec Utilities for Mac *(SUM II)* . 99.
3421 THINK Pascal 3.0 ..... 165.
3420 THINK C 4.0 ..... 165.
6748 Norton Utilities for the Mac 1.0 .... 84.
★Symmetry ... 30 day MBG
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★Synex ... 30 day MBG
7147 MacEnvelope 5.0 ..... 57.
6666 MacEnvelope Plus 2.0 ..... 159.
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6667 Prograph 2.0 ..... 249.
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True BASIC, Inc.
3587 True BASIC 2.02 ..... 55.
★Wayzata Tech. ... 60 day MBG
7679 Disc Tracy Prog. Detective *(CD-ROM)* 75.
★Williams & Macias ... 30 day MBG
6926 myDiskLabeler III 3.0 ..... 49.
4976 StickyBusiness 1.2 ..... 89.
6927 StickyBusiness Plus 1.2 *(bar codes)* 149.
★Zedcor ... 60 day MBG
3985 ZBasic 5.0 ..... 99.



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4751 *Persuasion 2.0*–1990 Macworld World-Class Award for *Business Presentation Graphics*. Imports text from word processors, and PICT and EPS graphic imports from MacDraw, FreeHand, etc. ..... **$329.**

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5127 Manhole *(CD-ROM)* ..... 34.
5517 Cosmic Osmo ..... 40.
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1215 Practica Musica 2.2 ..... 69.
★Beacon Technology ... 30 day MBG
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4968 HyperBible 1.0 *(New International)* 175.
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3961 Talking Tiles 1.0 ..... 26.
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Broderbund Software
4314 Type! 1.0 ..... 18.
5886 Star Wars *(CP)* ..... 23.
4540 Ancient Art of War at Sea *(CP)* ..... 26.
6516 The Playroom *(CP)* ..... 29.
4229 Carmen Sandiego Series *(CP)* ....ea. 29.
4966 SimCity 1.2 *(CP)* ..... 29.



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5237 Whole Earth Catalog *(CD-ROM)* ... 89.
Bullseye
1544 Ferrari Grand Prix *(CP)* ..... 31.
4074 P51 Mustang Flight Simulator *(CP)* . 31.
Carina Software
5726 Voyager 1.2 ..... 88.
★Casady & Greene ... 60 day MBG
2268 Crystal Quest 2.2X ..... 29.
7495 Mission Starlight ..... 29.
7498 Sky Shadow ..... 29.
Coda Music Systems
5854 MusicProse 1.01 ..... 187.
5604 Finale 2.0 ..... 549.
Davidson & Associates
1734 Math Blaster! 1.0 *(CP)* ..... 29.
6128 Math Blaster Mystery *(CP)* ..... 29.
★Electronic Arts ... 30 day MBG
6716 Pipe Dreams ..... 17.
6297 Halls of Montezuma ..... 26.
6663 Sands of Fire ..... 32.
4064 Chuck Yeager Flight Simulator .... 32.
6594 Starflight ..... 39.
1846 Deluxe Music Construction Set 2.5 . 84.



Salient ... 30 day MBG
7404 *DiskDoubler 3.0*–Expand your disk drive capacity. Fast, easy and safe, DiskDoubler dramatically increases the storage capacity of any Mac drive. "Performance is outstanding" evaluates *MacUser*, 7/90. (4½ Mice rating) **$45.**

★First Byte ... 30 day MBG
5294 Puzzle Storybook 1.0 *(ages 3-8)* ... 27.
5293 Dinosaur Discovery Kit 1.0 *(ages 3-8)* 27.
★Great Wave ... 30 day MBG
KidsTime 1.2, American Discovery 2.3, NumberMaze 1.1, KidsMath 1.1 ea. 26.
2273 ConcertWare+ 4.0 ..... 38.
2271 ConcertWare+ MIDI 5.1 ..... 98.
★HyperGlot ... 30 day MBG
Word Torture - Beginner to Advanced *(Span., Fren., Germ., Ital. & Rus.)* ea. 29.
Pronunciation Tutor - Beginner *(Spanish, French, German)* ... ea. 35.
Verb Tutor - Intermediate *(Spanish, French, German)* ... ea. 42.
6604 Verbal Aspect - Inter. *(Russian)* .... 42.
7472 Russian Noun Tutor *(w/sound)* .... 59.
6611 Kanjimaster - Beg. *(Japanese)*.... 105.
7473 Learn to Speak French *(CD-ROM)*. 175.
Individual Software
7425 Training for Microsoft Word 4.0 .... 26.
4990 Training for PageMaker 3.0 ..... 26.

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6916 *Dynodex 1.2*–Super-fast database that manages your addresses and prints to Filofax, Day-Timer, and most personal organizers. Includes free DA version and 100 sheets of Dynodex Instant Address Book Paper ... $57.

★Inline Design ... 30 day MBG
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7622 Darwin's Dilemma. . . . . 32.

★Knowledge Revolution ... 90 day MBG
7310 Interactive Physics . . . . . 169.

★Learning Company ... 30 day MBG
2670 Reader Rabbit 2.2 *(CP) (ages 4-7)*. . 30.
5453 Talking Math Rabbit 1.0 *(ages 4-7)* . 30.

★Microsoft ... 30 day MBG
2868 Flight Simulator *(CP)* . . . . . 32.

Miles Computing
5253 The Puzzle Gallery . . . . . 26.
2765 Fool's Errand . . . . . 32.

Mindscape
4083 Balance of Power 1990 *(CP)* . . . . . 29.
4596 Deja Vu II *(CP)* . . . . . 29.
2743 Crossword Magic *(CP)* . . . . . 29.



Beagle Bros. ... 30 day MBG
7691 *Flash 1.0*–Start flashing your coworkers today! The friendliest way to transfer files over AppleTalk–without a File Server. Transfer files from the Finder or within any application $127.

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(French, Italian, Spanish, German, Russian, Hebrew, & Japanese) ea. $35.

★Personal Training Sys. ... 60 day MBG
MacConnection carries the entire line of PTS modules for Excel 2.2, HyperCard, Word 4.0, Persuasion 2.0, PageMaker 4.0, Illustrator 88, FileMaker II, FreeHand 2.02, and the Macintosh . . . . . ea. 52.

Postcraft
6466 Citadel . . . . . 26.

Premier Technology
5773 Strategic Conquest Plus 2.0 . . . . . 34.
5774 NetTrek—The Real Version 2.3 . . . . 34.

★Shodan ... 30 day MBG
7689 Leprechaun . . . . . 29.

Sierra On-Line
3397 Leisure Suit Larry *(CP)* . . . . . 23.
Manhunter: San Fran. or NY *(CP)* ea. 28.
3396 King's Quest III *(CP)* . . . . . 28.
7367 Space Quest III *(CP)* . . . . . 39.

★Silicon Beach ... 60 day MBG
3502 Beyond Dark Castle . . . . . 32.
3503 Dark Castle 1.1 . . . . . 32.

★Softstream Int'l., Inc. ... 30 day MBG
4071 Mac•Man. . . . . 23.
4073 Colour Billiards . . . . . 38.

★Software Toolworks ... 30 day MBG
1842 Chessmaster 2100 1.1 . . . . . 32.
4619 Mavis Beacon Typing 1.3 *(CP)* . . . . 32.
4588 Life & Death *(CP)* . . . . . 32.
6111 Cribbage King-Gin King . . . . . 39.

★Spectrum Holobyte ... 30 day MBG
Tetris 1.1 or Welltris 1.1. . . . . ea. 20.
3459 Falcon 2.2 . . . . . 30.

★Spinnaker ... 30 day MBG
2328 Sargon IV *(CP)* . . . . . 28.

★Toyogo ... 30 day MBG
7615 Nemesis Joseki's Genius 4.7 . . . . . 26.
7625 Nemesis Tactical Wizard 4.7 . . . . . 31.
7624 Nemesis Go Master 4.7. . . . . 41.
7623 Nemesis Go Master Deluxe 4.7. . . . 88.

★Wayzata Tech. ... 60 day MBG
6369 The World Factbook 1989 *(CD-ROM)* 69.
7678 USA Factbook *(CD-ROM)* . . . . . 75.
7374 Sport News Baseball Stats *(CD-ROM)* 139.

★XOR ... 30 day MBG
6152 TaskMaker *(CP)*. . . . . 27.
6040 MacGolf Classic *(CP)* . . . . . 52.

NETWORKS & COMMUNICATIONS

★Abaton ... 30 day MBG
6266 InterFax 24/96 Modem . . . . . 419.

★CE Software ... 60 day MBG
5638 In/Out *(10 user)* . . . . . 187.
5174 QuickMail 2.2 *(5 user)* . . . . . 215.
5173 QuickMail 2.2 *(10 user)* . . . . . 315.

★CompuServe ... 60 day MBG
1676 CompuServe Information Service . . 23.
1673 CompuServe Navigator 3.0 . . . . . 49.
1674 Standard Service/Navigator Bundle 69.



Aldus/Silicon Beach ... 30 day MBG
3506 *SuperPaint 2.0*–1990 Macworld World-Class Award for *Paint B&W*. Combines painting and drawing capabilities. Customizable features, unique selection tools and more . . . . . $125.

Connect, Inc.
5834 Connect 1.5 for the Macintosh . . . . 63.

★DataViz ... 60 day MBG
1823 MacLink Plus/PC 4.5. . . . . 119.
4842 MacLink Plus/Translators 4.5 . . . . . 99.

★Dove Computer ... 60 day MBG
6758 DoveFax Desktop. . . . . 279.
FastNet III, SE, or SE/30. . . . . ea. 375.

★Dow Jones ... 30 day MBG
5295 News/Retrieval Membership Package 24.
1785 Desktop Express 1.03 . . . . . 95.

★Farallon Computing ... 30 day MBG
5707 Timbuktu 3.1 . . . . . 95.
4867 Timbuktu 3.1 30-Pack. . . . . 1285.
4866 Timbuktu/Remote 2.0. . . . . 123.
6371 Timbuktu/Remote Access Pack . . 845.
2202 PhoneNET to LocalTalk Adapter . . . . . 8.



Custom Applications ... 30 day MBG
6517 *Freedom of Press 2.4*–1989 MacUser Editors' Choice Awards for *Software Product of the Year* and *Best Graphics/Publishing Utility*. Brings PostScript-printing capabilities to non-PostScript output devices . . . . . $255.

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5664 PhoneNET StarConnector..... 17.
6273 PhoneNET StarConnector 10-Pack . 129.
2203 PhoneNET Connector *(DIN-8)*..... 31.
4869 PhoneNET Connector 10-Pk *(DIN-8)* 198.
2204 PhoneNET Connector *(DB-9)* ..... 31.
5251 PhoneNET CheckNET..... 64.
2206 PhoneNET StarController 300..... 825.
6687 PhoneNET StarController-EN .... 1599.
5893 Portable Pack..... 329.
6778 Remote/Wakeup Cable..... 33.
6766 MediaTracks..... 189.
6767 MediaTracks Multimedia CD Pack. 319.
6768 MediaTracks Multimedia Pack.... 319.

★Freesoft ... 60 day MBG

6115 White Knight 11.6..... 85.

Hayes

2300 Smartcom II 3.1C..... 84.
2307 Smartmodem 2400..... 349.
6655 V2400 Baud Modem ..... 469.
5991 V9600 Baud Modem ..... 759.

Insignia Solutions

7058 SoftPC-AT/EGA Module ..... 125.
4089 SoftPC 1.3 ..... 245.
6688 SoftPC for the Mac Portable ..... 245.

Intel Corporation

5119 2400EX Modem ..... 179.
6265 2400EX with QuickLink II ..... 195.
6420 2400EX MNP Modem..... 229.
6650 2400EX MNP with QuickLink II... 249.

★Microsoft ... 30 day MBG

5858 Microsoft Mail 2.0 Workstation.... 83.
5856 Microsoft Mail 2.0 Server..... 245.

★Nuvotech ... 60 day MBG

3000 TurboNet ST *(DIN-8)*..... 30.
6751 TurboNet ST *(12-Pack)*..... 279.
5277 TurboBridge ..... 319.
6750 NuvoLink II..... 275.
6272 NuvoLink SC ..... 309.
6261 TurboStar ..... 1095.

Orchid Technology

6949 OrchidFAX Modem..... 459.

★Practical Peripherals ... 30 day MBG

3102 2400 Baud External Modem..... 179.
5285 PM 2400SA MNP Modem ..... 209.
3089 Mac Communications Pack 1.5 .. 225.

★Shiva ... 30 day MBG

3444 NetSerial X232..... 275.
4347 NetBridge..... 339.
4942 TeleBridge ..... $339.
3443 NetModem V2400 ..... 429.
6917 NetModem V.32 ..... 1429.
6519 EtherGate..... 1629.

★Software Ventures ... 30 day MBG

3455 MicroPhone II 3.0 ..... 215.

★Solutions, Inc. ... 60 day MBG

6721 MailMaker 5 User Pack 1.1 ..... 117.
4308 BackFAX *(reqs. Apple FAX modem)*. 139.
6720 FAXGATE Plus 1.1 ..... 239.

★Synergy ... 30 day MBG

6618 VersaTerm 4.1.1 ..... 88.
6619 VersaTerm-PRO 3.1.1 ..... 174.

★TOPS ... 30 day MBG

4188 TOPS Teleconnector *(DIN8)* ..... 23.
4598 TOPS FlashBox..... 118.
3723 TOPS Mac 2.1 *(limited supply)*.... 137.
3720 TOPS Flashcard ..... 155.
7057 MacPrint TOPS Network Version 1.0 165.
6264 TOPS Networking Bundle 3.0 .... 187.

★Traveling Software ... 60 day MBG

3729 LapLink Mac III Connectivity Pac.. 119.
6741 LapLink Mac III Network Pac..... 185.



Farallon Computing ... 30 day MBG

PhoneNET Connectors–1990 Macworld World-Class Award for *Networking*. Patented connectors run LocalTalk over ordinary telephone wiring.

2203 *PhoneNET Connector (DIN-8)* ..... $31.
2204 *PhoneNET Connector (DB-9)* ..... 31.

INPUT/OUTPUT

★Abaton ... 30 day MBG

7432 Scan 300/GS ..... 1099.
7433 Scanner Kit w/Digital Darkroom .. 259.
7431 Scanner Kit w/ImageStudio..... 259.

★American Power ... 30 day MBG

5895 UPS 110SE..... 209.
6686 UPS 370ci ..... 295.

Caere

4476 OmniPage 2.1 ..... 539.
OmniSpell or OmniDraft..... *ea.* 69.
6661 OmniProof ..... 105.

★CH Products ... 30 day MBG

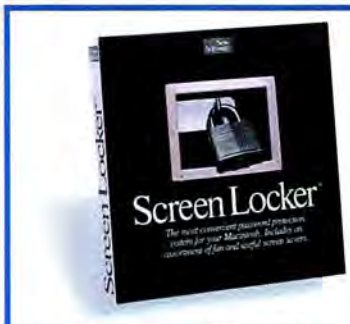
7343 Mach IV Plus Joystick *(Quad or ADB)* 51.
7344 Rollermouse *(ADB)*..... 79.

★CoStar ... 30 day MBG

6090 LabelWriter..... 185.
6067 LabelWriter Labels ..... 11.
7452 LabelWriter Labels *(12-Pack)*..... 63.

★Datadesk ... 30 day MBG

1818 HyperDialer ..... 32.
6901 Switchboard *(modular keyboard)* . 175.
MAC-101 Keyboards ..... *ea.* 129.



Now Software ... 30 day MBG

6924 *ScreenLocker 1.0*–The easiest and most convenient password protection system for the Mac. Includes attempted break-in log, personalized backdoor access and several screen savers ..... $45.

★Forte Communications ... 30 day MBG

7317 Remote Keyboard/Mouse..... 289.

GDT Softworks

7687 Mac Daisy Link..... 59.
6256 PrintLink Collection 3.01..... 59.
6151 JetLink Express 1.2 ..... 89.

Hewlett-Packard

6514 HP DeskWriter Printer..... 859.

★Kensington ... 30 day MBG

Turbo Mouse 3.0 *(Plus or ADB) ea.* 109.

Koala

2593 MacVision 3.0..... 259.

Kodak

6730 DICONIX M150 Plus Printer ..... 489.

★Kraft Systems ... 60 day MBG

7519 KM30 ADB Joystick ..... 49.
6099 ADB Trackball *(with foot pedal)* .... 79.

★Logitech ... 30 day MBG

5082 ScanMan Mac Model 32..... 319.

Magnavox

6693 9CM080 14" Color Monitor..... 529.
6690 14" Color Monitor with Micron Xceed for SE/30 *(640 x 480)*.... *special* 849.
6691 14" Color Monitor with Micron Xceed for Mac II *(640 x 480)*.... *special* 849.



Orchid Technology

6949 *OrchidFAX Modem*–FAX or transfer data files in the background at 9600 baud with OrchidFAX modems. Bundled with BackFAX software, OrchidFAX is fast, easy-to-use and networkable ..... $459.

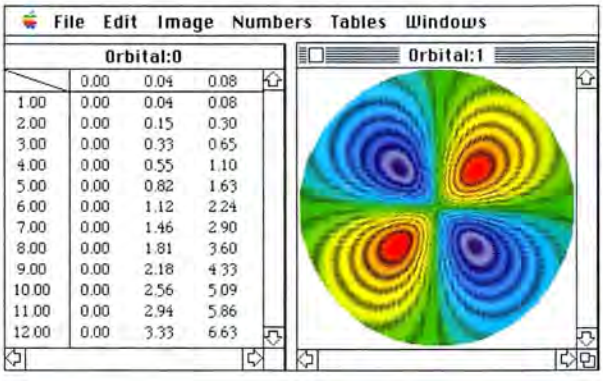
DATA ANALYSIS

Spyglass Transform and Spyglass View

Spyglass' first products let you analyze huge arrays of numbers by viewing them as pictures.

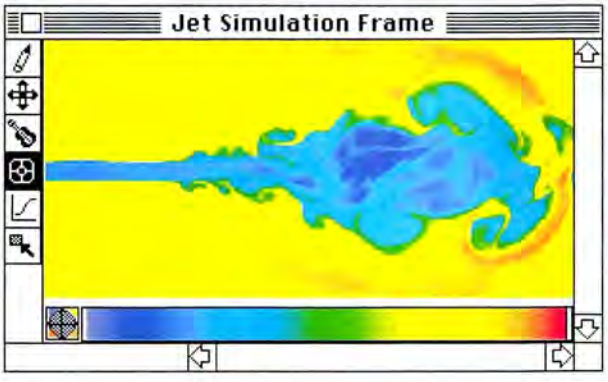
If you've ever spent days staring at a spreadsheet with hundreds or even thousands of rows and columns, searching for a grain of meaning while you felt your brain going numb, the solution to your problem may be a family of products from Spyglass. Spyglass has released two packages, Spyglass Transform and Spyglass View — and two others, Spyglass Dicer and Spyglass Format, are on the way. These packages let you operate on your numbers and turn them into pictures that you can manipulate to enhance significant patterns that may otherwise remain hidden. Pictures are often worth much more than a thousand numbers.

SPYGLASS TRANSFORM Let's take a look at the whole process to get a better idea of how it works. First, you need data. Spyglass Transform would prefer to have it in a format called HDF (Hierarchical Data Format), a standard nonproprietary format for storing data in the form of floating-point numbers, images, and additional information in a single file. But if your applications don't generate HDF files, Spyglass offers two solutions: Either employ the provided FORTRAN or C routines in your data-generating programs, or get your data into an Excel spreadsheet. Spyglass provides an Excel macro for converting the spreadsheet data into an ASCII file that can be read by the Import Text menu item in Spyglass Transform. If you don't have Excel, it's still a snap to produce the ASCII file with nothing more than a word processor. Once the data is inside Spyglass Transform, you can save it as an HDF file for later use.



	0.00	0.04	0.08
1.00	0.00	0.04	0.08
2.00	0.00	0.15	0.30
3.00	0.00	0.33	0.65
4.00	0.00	0.55	1.10
5.00	0.00	0.82	1.63
6.00	0.00	1.12	2.24
7.00	0.00	1.46	2.90
8.00	0.00	1.81	3.60
9.00	0.00	2.18	4.33
10.00	0.00	2.56	5.09
11.00	0.00	2.94	5.86
12.00	0.00	3.33	6.63

Spyglass Transform lets you convert your numerical data into pictures. Here you see a small piece of the data from Transform's spreadsheet (on the left) that was used to generate a polar plot of a hydrogen orbital (on the right).



Spyglass View lets you manipulate the colors in your image with the eraser, drag-color, or fiddle tool. This is a frame from a supersonic-jet-simulation movie showing the jet decaying from laminar to turbulent flow.

Spyglass Transform displays data in a standard spreadsheet. Unfortunately, to change a single item, you have to double-click on the cell and fill in a dialog box. (Shame on Spyglass for this bad interface.) Every HDF file has an associated "notebook" in which you make notes about the data and, more importantly, make calculations. You perform operations on your data by entering standard FORTRAN-style statements and then choosing Calculate From Notes. With the built-in functions, this makes for a fairly powerful data-analysis tool. You can add, subtract, multiply, or divide by constants; perform logarithmic and trigonometric functions; and perform other transformations on the data in the table. You can also do operations with multiple data sets — subtracting one set of data from another to find the difference between them, for instance. All these operations produce a new resultant array, so your original data remains undisturbed. (You should do *very* complex calculations on your supercomputer before the numbers make it into Spyglass Transform.)

Once you have transformed the data, you can choose Generate Image, Interpolated Image (for producing a smoother graphic), Line Graph, or Polar Image (for angular data) from the Image menu to make a picture of the selected spreadsheet. Spyglass Transform provides a selection of default color palettes for viewing the resulting graphic. You can click on a number in the spreadsheet and see the clicked point in the graphic or vice versa, so you can easily go back and forth between graphical and numerical representations. Line Graph gives you a more traditional plot of a single highlighted row or column. You can also adjust the exact range of the data included in the graphic (in case you have a few "wild" points that mess up the color scaling). To adjust the colors properly, you'll want to save your data and reopen the HDF file in Spyglass View.

SPYGLASS VIEW Spyglass View provides a variety of ways to view your data. It can also string a set of pictures (data sets) together and animate them, so

tech support gratis.

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6680 Xceed for SE/30 *(640 x 480)* . . . . $349.
6673 Xceed for SE/30 *(1024 x 768)* . . . . 589.
7149 Xceed IIci - 128 Cache Card . . . . . 589.

★MicroSpeed ... 30 day MBG

6620 MacTRAC . . . . . 65.
6621 MacTRAC ADB . . . . . 75.

★Mouse Systems ... 30 day MBG

7520 Little Mouse . . . . . 75.

★Nutmeg Systems ... 30 day MBG

6240 30/2 Interface *(SE/30 video board)* 499.
2994 15" Monitor for Mac SE. . . . . 599.
6168 15" Monitor for Mac SE/30 . . . . . 599.
2993 15" Monitor for Mac II . . . . . 599.
4003 19" Monitor for Mac SE. . . . . 995.
7152 19" Monitor for Mac SE/30 . . . . . 995.
4004 19" Monitor for Mac II . . . . . 995.

Olduvai Software

3034 Read-It! OCR 2.1 . . . . . 245.

★Orange Micro ... 30 day MBG

3036 Grappler *(9 pin)* . . . . . 78.
6229 Grappler LX . . . . . 128.

Pacific Data Products

7412 Pacific MacPage PE . . . . . 459.
7411 Pacific MacPage. . . . . 425.



Altsys
6499 Metamorphosis 1.5–Complete font conversion utility. Convert any PostScript font into Type 1 (ATM compatible), Type 3, & EPS editable outlines which can be manipulated in programs like Aldus FreeHand or Adobe Illustrator . **$149.**

RasterOps

7464 ColorBoard 208 . . . . . 395.
7463 ColorBoard 264 for Mac II. . . . . 595.
7469 ColorBoard 264 for SE/30 . . . . . 719.
7457 Video ColorBoard 364 . . . . . 1595.
7468 ClearVue/GE System for Mac II . . 1759.
7458 ColorBoard 708+ 16" Monitor . . 3599.
7462 RasterOps 8L . . . . . 799.
7461 RasterOps 24L . . . . . 3195.

SAFE Power Systems

4561 SAFE 250 Watt Backup . . . . . 219.
6747 SAFE 400S Watt Backup. . . . . 399.

TheComplete PC

6104 Half-Page Scanner/400 . . . . . 295.
6103 Full-Page Scanner *(w/OmniPage SE)* 758.

Thunderware

3648 ThunderScan Plus ThunderWorks. 199.
4994 LightningScan 400 . . . . . 385.

MEMORY & DRIVES

SIMMs ... 2 year warranty

1107 1 Meg SIMMs *(80ns)*. . . . . 69.



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Turbo Mouse Plus and Turbo Mouse ADB–1990 Macworld World-Class Award for *Input Devices* for the fourth straight year. Features dual buttons (regular and click lock) and chording to perform one of seven functions . . . . . **each $109.**

7502 1 Meg SIMMs for Mac IIfx *(80ns)*. . . 95.
4 Meg SIMMs *(80ns)* . . . . . call

Apple Computer

6707 Mac Portable 1 Meg. Exp. Kit . . . . 429.

CD Technology

6983 CD-ROM Porta Drive . . . . . 649.

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3989 800K External Disk Drive . . . . . 149.
5133 20+ Meg Hard Drive . . . . . 309.
3990 30+ Meg Hard Drive . . . . . 379.
3991 45+ Meg Hard Drive . . . . . 435.
5275 60+ Meg Hard Drive . . . . . 469.
5276 80+ Meg Hard Drive . . . . . 529.
5456 45 Meg Removable Drive . . . . . 699.
5736 45 Meg Removable Cartridge. . . . . 89.

★Dove Computer ... 60 day MBG

1802 Dove Tool Kit. . . . . 15.
1801 SCSI Interface/Port . . . . . 109.
6726 MaraThon MultiComm . . . . . 319.
6725 MaraThon 030 for Mac II. . . . . 449.
6724 MaraThon 030 for SE . . . . . 449.
6723 MaraThon 030 for Plus . . . . . 449.
7305 MaraThon 030 for Mac IIx. . . . . 449.
1809 MacSnap 524S. . . . . 239.
1812 MacSnap 548S. . . . . 479.



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3455 MicroPhone II 3.0–New version of top-selling telecom software. Build graphic front-ends to remote services & corporate mainframes. Supports XCMDs & XFCNs, ZMODEM, icons, European languages, color & sound **$215.**

7503 Cache Card for Mac IIci . . . . . $589.
6973 MacSnap 2S *(2 Meg)* . . . . . call
6975 MacSnap 4S *(4 Meg)* . . . . . call

★Kennect Tech. ... 30 day MBG

5631 Rapport . . . . . 195.
7588 Drive 360 . . . . . 249.
7590 Drive 1200 . . . . . 249.
5632 Drive 2.4 *(includes FastBack II)* . . . 325.

★Micron ... 30 day MBG

7149 Xceed IIci-128 Cache Card . . . . . 589.

NEC

7352 Battery Pack for CDR35 . . . . . 59.
6744 CDR35 CD-ROM Portable Drive . . 399.
6743 Mac Driver Kit. . . . . 64.

★Pacific Rim ... 30 day MBG

7382 Platinum 800k Drive . . . . . 145.

Quantum

7521 Quantum 40 Meg Internal Drive . . 399.
7522 Quantum 80 Meg Internal Drive . . 659.

★SuperMac Tech. ... 30 day MBG

5447 Dataframe XP 30 Hard Drive. . . . . 599.
5448 Dataframe XP 60 Hard Drive. . . . . 799.
5449 Dataframe XP 100 Hard Drive . . . 1049.
7451 Dataframe XP 200 Hard Drive . . . 1399.
5451 Dataframe XP 330 Hard Drive . . . 2369.



DeltaPoint ... 60 day MBG
6095 DeltaGraph 1.5–1989 MacUser Editors' Choice Award for *Best Presentation Product.* A charting package with the flexibility and power to create captivating charts and dramatic graphics, all in one program . . . . . **$109.**

Toshiba

6749 XM 3201 CD-ROM Drive. . . . . 899.

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Apple Computer

1113 Apple ImageWriter Black Ribbon . . 10.
6717 MIDI Interface. . . . . 84.
1114 LaserWriter Plus Toner Cartridge. . . 99.
1115 LaserWriter II Toner Cartridge . . . . 105.

★Avery ... 60 day MBG

4812 Laser Labels 1¾" x ½" *(Qty. 2000)* . . . 7.
4808 Laser Labels 4" x 1⅓" *(Qty. 1400)* . . . 24.
4807 Laser Labels 1" x 2⅝" *(Qty. 3000)* . . . 24.
7050 Laser Labels-Clear 2⅝" x 1" *(Q. 1500)* 32.
4864 Disk Labels 3½" *(Qty. 250)* . . . . . 13.
5392 Disk Labels 3½"-*Laser (Qty. 630)* . . 29.
5403 Address Labels 1 7/16" x 4" *(1000)* 9.
4865 Address Labels 3½" x 15/16" *(3750)* 15.
4811 Transparencies 8½" x 11" *(Qty. 50)* 22.

★Basic Needs ... 60 day MBG

Dust Covers . . . . . call
Hard Top Keyboards . . . . . *ea.* 15.

800-334-4444



Systat, Inc. ... 30 day MBG

7410 *Systat 5.0*–The most comprehensive statistical analysis and scientific graphics package is now fully menued enabling users to perform the most sophisticated procedures quickly and easily ..... $599.

6682 Hard Top ImageWriter II ..... 16.
7413 Mac IIcx/ci Monitor Stand ..... 40.
7417 Cordless Mouse ..... 89.

★Computer Coverup ... 60 day MBG

1723 ImageWriter II Cover ..... 8.
1720 Mac Plus Cover ..... 10.
1724 Mac SE Cover ..... 10.
1725 Mac SE Ext. Keyboard Cover set ... 10.

★CoStar ... 30 day MBG

7453 The Organizer Jr. ..... 69.
6091 The Organizer ..... 199.

Curtis Manufacturing

6733 GFP-3 *(Glass Filter Plus-Mac Plus, SE)* 65.

★Goldstein & Blair ... 30 day MBG

2267 The Macintosh Bible *(3rd Edition)* .. 19.

★I/O Design ... 30 day MBG

2379 MacLuggage Imageware II ..... 49.
2376 MacLuggage Macinware Plus .... 59.
2381 MacLuggage Macinware SE ..... 75.
6129 Ultimate SE/Ext. Carrying Case ..... 79.
7439 Ultimate SE/Ext. Neon Case *(green)* .. 89.
7440 Ultimate SE/Ext. Neon Case *(pink)* ... 89.
7438 Ultimate SE/Ext. Neon Case *(yellow)* . 89.

★Kensington ... 30 day MBG

4643 Mac II Stand and Cable Kit ..... 64.



Cutting Edge ... 30 day MBG

Cutting Edge Hard Drives are fast and reliable with access times as low as 23 milliseconds and a mean time between failure rating of up to 100,000 hours. An outstanding combination of quality and low price ..... **see line listing.**

2573 Tilt/Swivel *(platinum)* ..... $22.
4973 Power Tree 20 ..... 27.
2559 Apple Security Kit ..... 33.
2566 System Saver Mac *(platinum)* ..... 63.
2567 System Saver Mac *(beige)* ..... 63.
2546 A-B Box *(DIN-8)* ..... 63.
6763 SE Radiation/Anti-Glare Filter ..... 52.
5064 Apple Color Monitor Polarizing Filter 63.

★MacConnection ... 60 day MBG

4623 Solid Oak Disk Case, made by New England craftsmen *(holds 90 disks)* . 32.

★Mobius Technologies ... 60 day MBG

4470 Fanny Mac QT ..... 55.

★Moustrak ... 60 day MBG

Available in blue (listed) or gray.

2694 Moustrak Pad *(standard 7" x 9")* ... 8.
2692 Moustrak Pad *(large 9" x 11")* ..... 9.
2693 Moustrak Pad L/F *(large 9" x 11")* .. 10.

Ribbons

3255 ImageWriter II Ribbon Black ..... 4.
3261 ImageWriter II Ribbon Multi-4-Color . 9.
3270 ImageWriter II Rainbow 6-Pack .... 20.
3260 ImageWriter LQ Black Ribbon ..... 17.



Microsoft ... 30 day MBG

2865 *Excel 2.2A*–1990 Macworld World-Class Award for *Spreadsheets*. Sophisticated financial and numerical analysis and reporting, high-end charting and graphs, as well as database management ..... $245.

★Sopris Softworks ... 60 day MBG

4019 Mac SE & Ext. Keyboard Cover *(navy)* 15.
4017 ImageWriter II Cover *(navy)* ..... 11.
4018 LaserWriter II Series Cover *(navy)* .. 17.
4012 High Trek ImageWriter Carry Case .. 49.
4013 High Trek Mac Plus Carry Case .... 59.
4014 High Trek Mac SE & Ext. Kybd. Case 69.
4862 SE Protection Pak *(ext. keyboard)* .. 75.

★Targus ... 60 day MBG

3618 ImageWriter II Carry Case ..... 45.
3617 Mac Plus/SE Carry Case ..... 55.
4015 Mac SE & Ext. Kybd. Carry Case .. 69.
6116 Mac IIcx Carry Case ..... 75.

★Tripp Lite ... 30 day MBG

6199 Isobar 4 *(surge suppressor, 4 outlets)* . 49.
6200 Isobar 6 *(surge suppressor, 6 outlets)* . 59.

STORAGE MEDIA

★Sony ... 60 day MBG

3297 3½" DS/DD Disks *(10)* ..... 13.
6148 3½" DS/DD Disks 3 Pak *(30)* ..... 30.
3298 3½" HD Disks 1.44 Meg *(10)* ..... 22.
6375 3½" HD Disks 3 Pak *(30)* ..... 56.
6659 QD2000 40 MB Data Cartridge .... 19.



Intel Corporation

6650 *2400EX MNP with QuickLink II*–Delivers high-quality communications with built-in error correction and data compression. Includes QuickLink II software, cable, and Intel's standard no-compromise 5 year warranty. ..... $249.

★MAXELL ... 60 day MBG

2792 3½" DS/DD Disks *(10)* ..... 14.
2793 3½" HD Disks 1.44 Meg *(10)* ..... 27.

★3M ... 60 day MBG

3943 DC2000 40 MB Data Cartridge .... 20.

★MacConnection ... 60 day MBG

6592 44 Meg. Removable Cartridge .... 85.

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- All U.S. shipments insured; no additional charge.
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- Upon receipt and approval, personal and company checks clear the same day for immediate shipment of your order.
- Corporate P.O.s accepted subject to credit approval.
- COD max. $1000. Cash or certified check.
- 120 day limited warranty on all products. Defective software replaced immediately. Defective hardware repaired or replaced at our discretion. All items subject to availability. Prices and promotions subject to change without notice.
- To order, call us anytime Monday through Friday 8:00 AM to 1:00 AM EST, or Saturday 9:00 AM to 5:30 PM EST. You can call our business offices at 603/446-7711 Monday through Friday 9:00 AM to 5:30 PM EST.

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Continental US: Barring massive computer failures and other natural or unnatural catastrophes, all credit card orders phoned into MacConnection weekdays by 8 PM EST will ship Airborne Express the same night for delivery the next business day, except for those within UPS Ground Zone 1 (which is also an overnight service). Saturday delivery available to many areas upon request. Some areas require an additional day delivery. The total freight charge on any order placed with MacConnection is only $3.

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"Thanks, comrades!"

Dear MacConnection,

Last month Control Data had the pleasure of hosting President Gorbachev. He and about 6,000 security agents, press, and on-lookers came to look at the new computers the Soviet Union bought from us. The day before the visit, someone realized we needed name badges in Russian and no one had a Cyrillic font to make them! The computer dealers in the phone book couldn't get us the font we needed. That afternoon we placed a call to MacConnection. By 10 a.m. the next day the name tags were coming off the printer. Thanks to your ability to deliver product overnight, and by stocking a lot more than just mainstream applications, you really helped us. Thanks comrades!

Carol A. Morse

Carol Morse
Control Data Corporation
Minneapolis, MN

1-800/334-4444

MacConnection®

MacConnection, 14 Mill Street, Marlow, NH 03456 1-800/334-4444 603/446-7711 FAX 603/446-7791

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Just for the record, all the ads in this series feature photographs of real live MacConnection customers and the real live letters they wrote us. Really!

EVERY YEAR, WE GIVE THE INDUSTRY A LESSON IN PRICE AND PERFORMANCE.



CLASS IS NOW IN SESSION.

Introducing the $2399 BLP II.

Two years ago, they called our Business LaserPrinter™ "The future of PostScript.®" Last year, they gave our PLP™ II the MacUser Editors' Choice Award. But this time, we're really giving them something to study. Because now, we've done what was considered impossible. We've produced a printer that dramatically outperforms the Apple® LaserWriter® IINT, at half the cost: the $2399 Business LaserPrinter II (BLP™ II).

PostScript For Less.

This is the printer you've always wanted, at a price you never thought you'd see. With true Adobe™ PostScript and built-in AppleTalk®, you and everyone else on your Macintosh® network can immediately start producing the highest quality, 300 dots-per-inch (dpi) graphics and text using your favorite software. You even get the same 35 fonts as you get with the Apple LaserWriter. But now, the real lesson begins.

Better At Any Price.

Even if money were no object, the BLP II would still be the printer of choice. It has 2 megabytes of RAM, user expandable to 4, plus a high-speed processor so it can image your document almost twice as fast as the IINT. And unlike the competition, the BLP II's SCSI port boosts performance and provides access to unlimited on-line fonts. Want more? How about a small footprint and silent sleep mode. Edge-to-edge printing. User-friendly LCD front panel display, cost-saving toner recycling system, and our advanced QuickEnvelope™ software that makes printing envelopes a snap. Still not enough?

The Fast Track: BLP IIS.

Maybe you have a large network, with a heavy print load. A network you thought required the speed, power and price tag of a LaserWriter IINTX. Well, think again. Because the BLP IIS gives you performance rivaling the IINTX at less than half the cost: an 8-page-per-minute printer for just $2899. Whether you choose the BLP II or the BLP IIS, you get compatibility not only with Macintosh, but with IBM® and compatibles, using PostScript or the optional LaserJet II emulation. And you get it fast.

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Just call us toll-free. We'll give you the name of your nearest GCC Technologies dealer. Or order direct from us, with a 30-day money-back guarantee and $9 overnight delivery. The $2399 BLP II and $2899 BLP IIS. What else can we say, except "class dismissed."

800-422-7777.

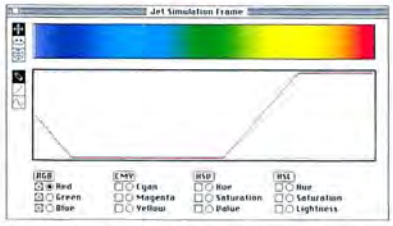
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AD #021108

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Spyglass View's palette manager lets you design and save new palettes with a variety of tools. You can work in the RGB, CMY, HSV, or HSL color systems.

you can see not only a single picture of your data but also how it changes over time, in space, or with any other independent variable. The program can run these animations from memory (fast!) or, if memory is limited, from disk (slower but still fascinating to watch). Although Spyglass View can produce line, contour, and 3-D-surface plots, its color tools are what is special.

With a raster image opened, you get an interesting palette of tools to manipulate the colors. The eraser tool lets you erase any color value to white (or any other color you choose). The drag-color tool lets you drag a color from one place on the graphic and replace it with another color. The fiddle tool allows you to compress and shift the color table to your heart's content. You can also draw lines and make selections with other tools.

If you like playing with palettes, you will love Spyglass View's palette editor. You are able to graphically design and save a new palette in the RGB (red, green, blue), CMY (cyan, magenta, yellow), HSV (hue, saturation, value), or HSL (hue, saturation, lightness) color systems.

THE BOTTOM LINE These programs sound simple in principle, but they do require some knowledge of FORTRAN syntax. Because Spyglass products are for visualization of sizable blocks of data, most of the market for which they are designed (mainframe and supercomputer users) should have no trouble with FORTRAN. Spyglass Transform has some minor bugs and strangenesses (bad management of scrolling windows in the spreadsheet and awkward sizing of the line graphs), but I suspect Spyglass will fix these in future versions. You should have a large color monitor, but 8-bit color is sufficient — these are 8-bit, not 24-bit, programs.

If you're into simulations or produce scads of numerical output, you'll want the Spyglass products. They can greatly simplify the job of sifting through a silo of chaff to find that kernel of meaning you've been straining your eyes to find.

— Ron Hipschman

Spyglass Predecessors

While I was researching this review, I stumbled on two wonderful CD-ROM discs: The Apple Science CD and the SIGCAT GRIPS '89 CD. Both discs contain hundreds of megabytes of images and software. Some of this public-domain software is virtually identical to the Spyglass products. These programs were written for the National Center for Supercomputing Applications (NCSA) and were the first applications from members of the development team that founded Spyglass. NCSA DataScope is the previous incarnation of Spyglass Transform, and NCSA Image (with its companion NCSA PalEdit) was Spyglass View in a previous life. NCSA Layout will become Spyglass Format. The authors of these programs knew they had a good thing going; some of them formed Spyglass and enhanced their public-domain efforts with new capabilities and features. (Spyglass Dicer will be a completely new product without a public-domain counterpart.)

You might want to get one or both CD-ROM discs and have a look at the original software first, essentially using the original versions as demos of the commercial products. The programs are low-cost or free, and you can get the source code if you want to hack. But remember, although documentation is included with the NCSA programs, tech support isn't. With the Spyglass products, you have access to the software's original authors, you get the Spyglass utilities that come with the packages, and you are eligible for future upgrades.

The Apple Science CD is not available commercially.

NCSA catalog
Published by: NCSA (Documentation Orders), University of Illinois at Urbana-Champaign, 605 E. Springfield Ave., Champaign, IL 61820; (217) 244-4130.

SIGCAT GRIPS '89 CD
Published by: Meridian Data, 5615 Scotts Valley Drive, Scotts Valley, CA 95066; (408) 438-3100.

Get Info

Spyglass Transform
★★★★
Published by: Spyglass, 701 Devonshire Drive, C-17, Champaign, IL 61820; (217) 355-1665.
Version: 1.0.
List Price: $395.

Spyglass View
★★★★
Published by: Spyglass, 701 Devonshire Drive, C-17, Champaign, IL 61820; (217) 355-1665.
Version: 1.0.
List Price: $395.

CAD

MacDraft

MacDraft 2.0 marks the triumphant return of an old favorite.

Introduced in 1985, MacDraft was one of the first object-oriented drawing programs for the Mac. It enjoyed early success with architects and designers, and at one time, it claimed a majority of the Mac CAD market. But the rapid evolution of 2-D CAD, paced by the increasing speed and power of Apple's hardware, made good old MacDraft seem increasingly out-of-date, particularly when compared with competitors such as MacDraw II, Canvas, or Blueprint.

Last year, MacDraft's publisher, Innovative Data Design, released a successful midpriced ($500) package called Dreams, which seemed to be the MacDraft replacement. The demand for simple, low-cost Mac CAD, however, is apparently strong enough to keep MacDraft alive. With the release of version 2.0, this classic program has caught up with the state of the art.

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The reason for this great leap in reliability is UltraDrive 50R's airtight design.

UltraDrive 50R is based on the latest breakthrough technology from Ricoh,® incorporating a contamination-free cartridge. Unlike the competition, these cartridges are manufactured in a "clean-room" environment, and are sealed to prevent interference from dust particles and everyday air contamination. No dust. No contamination. And no loss of data.

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Instead of buying a high-capacity hard disk, you can now purchase an UltraDrive 50R and simply add extra cartridges as your storage needs increase.

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And if you'd rather take your files with you, just toss the cartridge in a briefcase, and your data is ready to travel.

Value-Added Software.

Along with reliability, security, and portability, UltraDrive 50R also gives you plenty of software.

In fact, you get the same software that comes with our UltraDrive S Series of hard disks. You get SUM™ II, the award-winning disk utilities package from Symantec.™ You also get GCC's own spooling utility, QuickSpool™ II, as well as QuickEnvelope,™ which takes the hassle out of printing envelopes.

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UltraDrive 50R is just as easy to order. Simply call us toll-free and we'll give you the name of your nearest GCC Technologies dealer. Or order direct from us, with a 30-day money-back guarantee and $9 overnight delivery.

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AD #02110C

Up to Date

Changes New and Noted

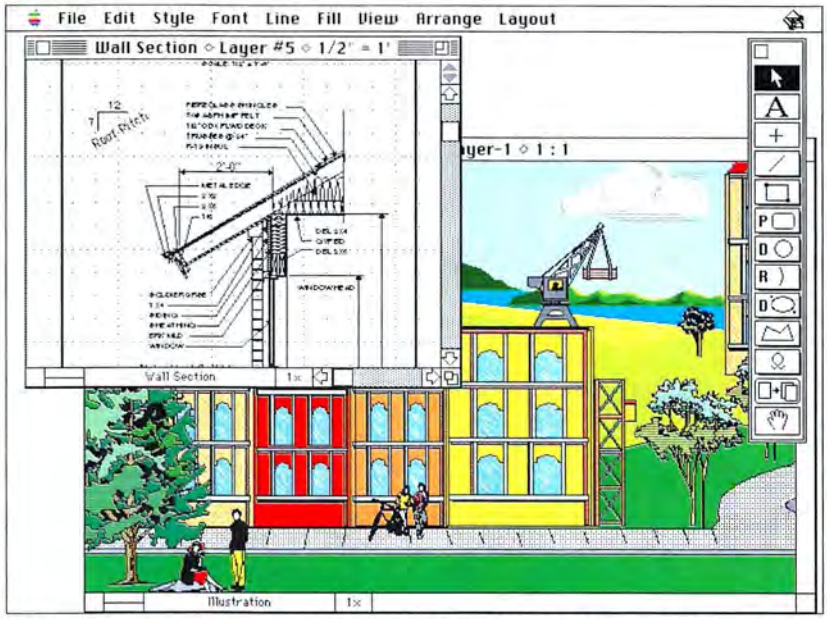
MICROSOFT WORD 4.0B is a "secret" update. Although Word 4.0B wasn't blessed with a formal announcement, Microsoft is shipping this version, calling it a minor maintenance release. It has improvements such as better compatibility with the Mac IIci and IIfx as well as the enabling of the Fractional Widths option in the Page Setup dialog box when the ImageWriter driver is selected (a fix that makes Word work better on an ImageWriter with ATM). Other fixes solve problems with large screens, multiple-monitor configurations, and 24-bit-color displays. Microsoft, One Microsoft Way, Redmond, WA 98052-6399; (206) 882-8088. $395; free to registered owners who request it.

CAPTURE, Mainstay's popular screen-capture utility, has had its second major upgrade. A total rewrite, version 3.0 now includes auto-scaling, which lets users specify the amount of scaling from 1 to 100 percent and gives the option of keeping the cursor visible. Mainstay, 5311-B Derry Ave., Agoura Hills, CA 91301; (818) 991-6540. $79.95; upgrades, $15 to registered owners or free if version 2.0 was purchased after April 15, 1990.

FONTOGRAPHER 3.1 now includes Type 1-font support. Altsys' PostScript type-design package can produce ATM-compatible Type 1 fonts, EPS files in Adobe Illustrator 1.1 format, Adobe Bitmap Distribution Format files for creating screen fonts on machines other than the Mac, better hinting for both Type 1 and Type 3 fonts, and automatically generated and hinted bit-mapped screen fonts. Altsys, 720 Avenue F, Suite 109, Plano, TX 75074; (214) 424-4888. $495; upgrades, $30 to registered owners or free if version 3.0 was purchased after March 1, 1990.

QUICKLOCK 2.0 is the latest iteration of Kent Marsh's screen-locking utility. Used in conjunction with the hard-disk-locking utility NightWatch, QuickLock can password-protect a screen and automatically pass control of the Mac's hard-disk drive to NightWatch at either a specified time or after an unauthorized attempt to use the Mac. Kent Marsh, P.O. Box 460289, 1200 Post Oak Blvd., Suite 210, Houston, TX 77056; (800) 325-3587 or (713) 623-8618. $59.95; upgrades, free for registered owners.

ISHIDO, the Oriental strategy game we reviewed in May (page 71) will finally see a mass-market version. Accolade has acquired the rights to distribute the package, so you won't have to pay the $295 limited-edition price. Accolade, 550 S. Winchester Blvd., Suite 200, San Jose, CA 95128; (408) 985-1700. $49.95.



MacDraft 2.0 marks the welcome return of one of the Mac's first drawing programs. The interface is still simple. The shadowed palette tools conceal pop-up menus with additional functions. Version 2.0 supports 24-bit color and dimensioning lines.

A FULL PALETTE MacDraft sports a floating palette of 13 drawing tools. Tools are modal — one remains selected until you select another. Many of the tool icons have multiple options accessible through pop-up menus. The circle tool, for example, lets you select Diameter, Radius, or Three Points as the drawing mode; a letter next to the icon identifies the currently selected mode. Diagonal lines can be constrained to angles of 45, 30, 15, or 5 degrees. The program does not provide a tool for drawing with double parallel lines, which is a popular labor-saving feature for creating walls in floor plans. Round-cornered rectangles can be drawn with proportional, constant-radius, or elliptical corners, and by dragging an extra handle, you can modify the shape of the corners.

Curves can be drawn as splines (passing through every point you designate) or as sophisticated Bezier curves (defined by endpoints and direction-control handles). Object rotation is precise — you can rotate an object in increments of less than a degree. The program provides precision to four decimal places, which is perfectly adequate for most users.

MacDraft can access the full spectrum of 16.7 million colors for objects, fill patterns, and text. There are palettes for 65 default colors and 64 editable fill patterns in addition to ten "laser grays," which appear on-screen as dithered black-and-white patterns but print as smooth tones on a PostScript output device.

The Snap to Object feature, which lets the cursor snap to the nearest vertex or endpoint of an existing object, is essential for precision drawing.

Drawings can be as large as 56.88 square inches, and there are simple, intuitive options for scrolling, panning, and zooming (with magnification up to 32x). You can name and save particular views and switch between them with keyboard command shortcuts.

LINES AND PICTURES The menu of line widths ranges from a fine hairline to 13 points. You can automatically add arrows, small circles, or other end marks to your lines and create any kind of dashed line. Best of all, you can create dimension lines, which include text that indicates the linear distance in the current drawing scale. The program can also report the total area of any selected objects, but there is no direct way to dimension angles — you have to create an arc that includes the desired angle and add the text. A Show Cursor Position option provides a continuous readout of the cursor's x,y coordinates. There is also a Show Size option, which displays a small window with the horizontal and vertical dimensions of the object you are creating. This information disappears, unfortunately, as

PRINTS GREAT. LESS SHILLINGS. THE NEW $1399 PLP II.



Now you can have everything you ever wanted in a laser printer. Without paying the price.

Introducing the lowest priced laser printer in history: the $1399 PLP™ II from GCC Technologies. GCC developed the very first personal laser printer in 1987, and has over 20,000 satisfied users... more than everyone else combined.

Finally, a revolutionary printer at a revolutionary price. In fact, at $1399, it's nothing short of a technological marvel.

Personal Desktop Printing.

Three years of research and development have put the finest printer technology right on your desktop: a combination of the newest third generation laser engine, GCC's own custom designed integrated circuits, and the market's most sophisticated QuickDraw™ imaging software yet.

Features such as a silent "sleep" mode, a very user-friendly LCD display and an envelope printing desk accessory have been carefully integrated. In the future, should your needs include PostScript,® there's even a user-installed upgrade.

The Highest Quality Printing.

Because PLP II includes 6 outline font families (for a total of 22 individual fonts), its razor-sharp, clean output can be shaped, scaled, and rotated to any point size—all at a full 300 dpi.

These outline fonts, combined with GCC's powerful QuickDraw imaging software, give you unlimited flexibility in producing perfect documents from such applications as PageMaker,® Word,® Excel,® MacWrite,® MacDraw,® Persuasion,® and Canvas.®

Even More Power: PLP IIS.

For those who demand even more power, there's also the PLP IIS.

With the PLP IIS, you get all the breakthrough technology of the PLP II, only now, you get it at a swift 8 pages per minute, making it the perfect solution for anyone printing a high volume of output.

You also get one megabyte of RAM, which can save you valuable time. For example, while PLP IIS is printing, your Macintosh can be processing the next page of your document.

And finally, with PLP IIS, you get a very powerful font library. In addition to the core set of 22 Bitstream® outline fonts, you also get a font package called Font Plus,™ which means you'll have over 40 fonts to choose from.

Dealer or Direct: Your Choice.

GCC has made acquiring your new PLP II or IIS just as easy as using it.

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AD #021107

soon as you finish drawing the object.

In addition to saving your work in its own drawing and stationery formats, MacDraft can save it as a standard PICT file or in a proprietary format called PictScript. The latter combines the PICT screen image with PostScript data for high-resolution output to a laser printer or imagesetter. PictScript provides the same output quality as EPS, but it preserves more formatting attributes and allows for easier editing and manipulation of graphics that have been exported to another application such as a word-processing or page-layout program.

A well-illustrated, thoroughly indexed manual of more than 350 pages accompanies the program. There are two well-organized step-by-step tutorials, an organization chart, and a floor plan for beginners. Once you've discovered the comprehensive on-line Help system, however, you may never need to open the manual again.

Innovative Data Design sells plotter drivers for MacDraft 2.0 as a separate package ($129). The extensive list of supported plotters includes models from CalComp, Graphtec, Hewlett-Packard, Houston Instruments, Roland, and others. Symbol libraries are offered in three separate packages: Volume 1 ($69) includes people, vehicles, furniture, and trees; Volume 2 ($39) includes flowcharting symbols, office items, borders, and corners; Volume 3 ($99) is a comprehensive collection of architectural, mechanical, and electrical elements.

THE BOTTOM LINE Offering a rich set of features at low price, with excellent documentation and support, MacDraft 2.0 is a serious contender in the crowded market for entry-level Mac drafting programs. It is particularly appropriate for high school or college-level introductory CAD classes or for a small architectural or construction contracting business, where its simple, generally familiar interface will help everyone become productive quickly. After all the high-end CAD programs we've seen, it's good to return to the basics with an old friend.

— Mike Markowitz

Get Info

MacDraft ★★★★½

Published by: Innovative Data Design, 2280 Bates Ave., Suite A, Concord, CA 94520; (415) 680-6818.

Version: 2.0.

List Price: $299.

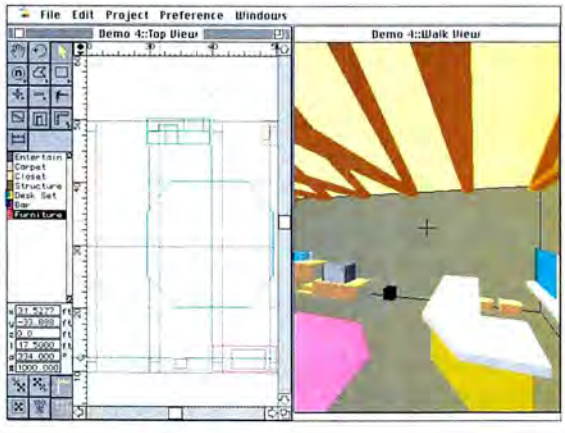
BetaWatch

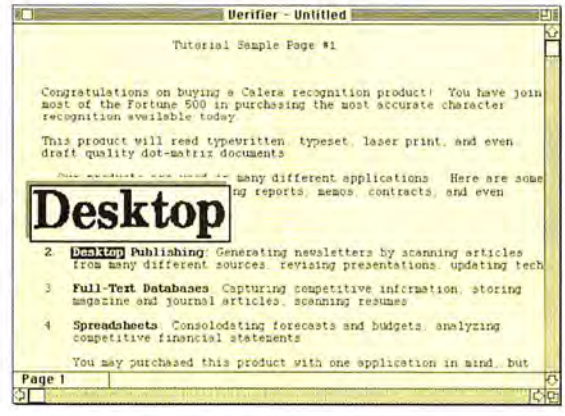
Products on the Horizon

Virtus WalkThrough is the next step in 3-D graphics. This virtual-reality system for spacial designers lets users quickly create enclosed spaces and then immediately move through them. The initial design takes place in the Design window, which is similar to working in a conventional CAD package. The difference is that as the walls, windows, doors, furniture, and so on are moved, added, or subtracted, the virtual reality — or 4-D — view, automatically updates. Once a plan has been finalized, it can be exported to a conventional CAD package for insertion of the necessary specifications. Architects and other designers should find this program a powerful brainstorming tool.

Virtus, 117 Edinburgh S., Suite 204, Cary, NC 27511; (919) 467-9700. Price not set at press time.

ETA: Fourth quarter 1990.





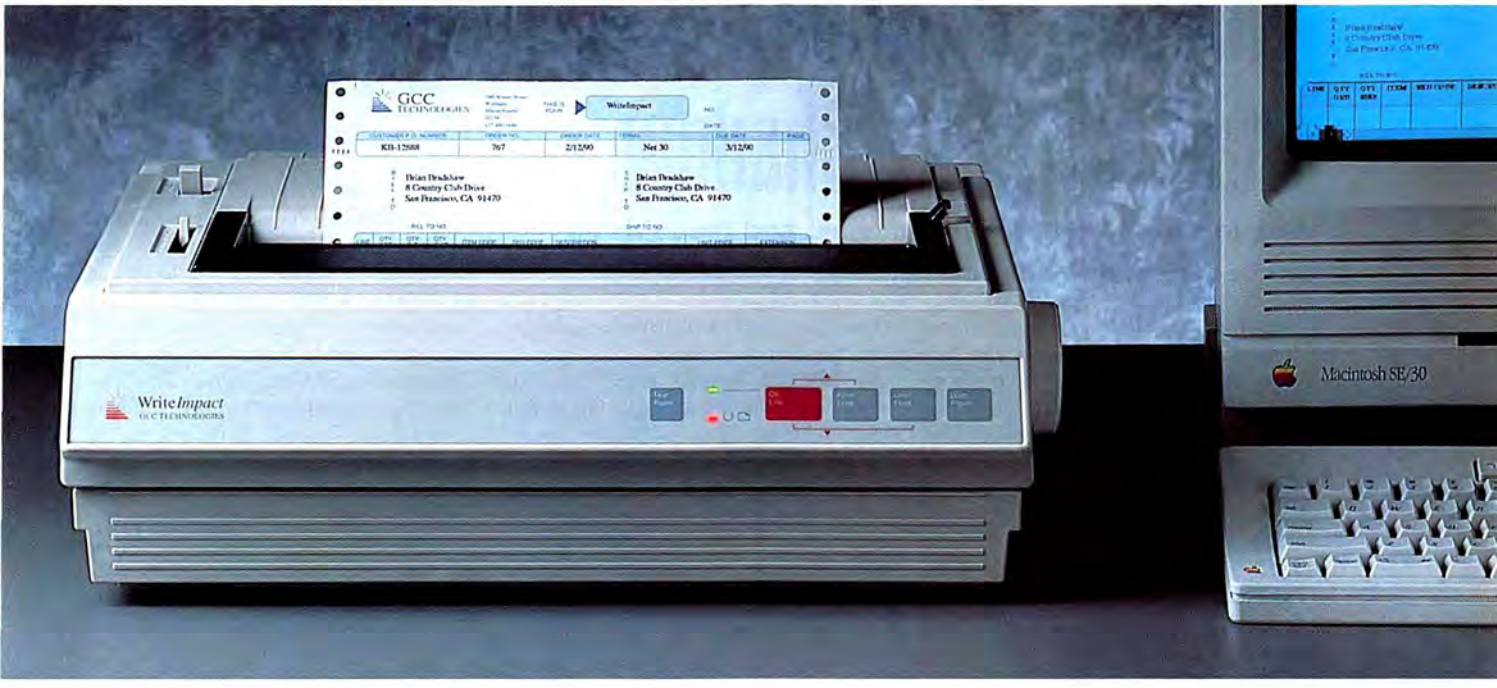
WordScan and **WordScan Plus** are the first Mac software-only OCR products from Calera Recognition Systems, which previously produced only dedicated hardware-based systems costing $20,000 or more. WordScan is an omnifont package that can recognize fax, draft- and letter-quality dot-matrix, typewritten, typeset, and laser-printed text. It uses a built-in 80,000-word dictionary, offers deferred processing, and supports font sizes from 6 to 28 points scanned at 300 dpi.

WordScan Plus is the enhanced version of the program. In addition to the basic WordScan features, it includes the CheckIt! Pop-up Image Verifier, which presents a list of possibilities for each questionable character or word. Other features include clipping, which lets users specify portions of a page or pages to be scanned before recognition; style sheets, which can reformat a document during recognition; multijob processing, which can create separate files for each job on-line; and multiple-zone support, with as many as 100 zones per page.

Calera Recognition Systems, 2500 Augustine Drive, Santa Clara, CA 95054; (408) 986-8006. WordScan, $595; WordScan Plus, $995.

ETA: Fall 1990.

WRITEIMPACT. THE FIRST DOT-MATRIX PRINTER WITH A WORK ETHIC TO MATCH YOUR OWN.



Finally there's a Macintosh® printer that works as hard as you do to stay ahead of the game. With the WriteImpact™ from GCC Technologies,℠ you can focus more on your business and less on your paper work. That's because WriteImpact is designed to handle the tough work loads associated with printing payroll checks, labels, large client mailings, and multi-part forms such as invoices and statements.

Paper Versatility.

WriteImpact is engineered with paper handling options that provide you with the versatility and flexibility to make your work day a little easier.

For starters, WriteImpact can print on assorted paper sizes and weights, which makes printing checks and multi-part forms hassle-free. You can choose to print your documents in push or pull tractor-feed mode, or in friction-feed for single sheets and envelopes.

And, thanks to automatic paper loading and parking, you can save time while printing your envelopes and single sheets without ever having to remove the tractor-feed paper. There's even a paper tear feature with automatic paper repositioning.

Need to print a large mailing on your company's letterhead? With WriteImpact's optional automatic sheet feeder, you just load the paper into the feeder and the printer does the rest of the work.

Letter Quality. Outline Fonts.

Compromise print quality for versatility? Never! Your work ethic wouldn't allow it.

Now, with WriteImpact you don't have to, because its 24-pin print head produces letter-quality output at 360 horizontal x 180 vertical dots per inch (dpi).

You also get 22 high-quality Bitstream® outline fonts, which can be rotated to any angle, shaped, and scaled in point sizes ranging from 2 to 500 points, while maintaining remarkable clarity and definition.

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ENTERTAINMENT

Welltris, Mission Starlight, Sky Shadow

Sequels aren't just for the movies, and these three arcade-style games prove it.

An old axiom in business goes something like this: Give the people what they want, and if they want it badly enough, repackage it and give it to them again. This philosophy has brought us everything from countless movie sequels to a dozen different kinds of raisin bran. Also in keeping with this philosophy, three new arcade-style games — Welltris, from Spectrum HoloByte, and Mission Starlight and Sky Shadow, from Casady & Greene — clearly look to their predecessors for their inspiration.

WELLTRIS Welltris is the sequel to Tetris, the Soviet smash hit of last year. Whereas Tetris asked you to maneuver falling shapes in 2-D, Welltris increases the challenge by demanding that same skill in 3-D. The setup is as follows: Different-shaped objects slide down the sides of a square well. You control the rotation of each falling object and its movement from one wall to another. At the well's bottom is an 8 x 8 grid. Your job is to position the objects on the grid so that they form lines. Lines disappear as you complete them, and other pieces on the grid shift as space becomes available. As you move to each succeeding level of difficulty, the objects fall faster and their shapes become more complex.

Like Tetris, Welltris offers a musical accompaniment (thankfully, you can turn it off), randomly generated pieces, optional preview of the shape due to appear next, disks that contain both the color and black-and-white versions, and a top-ten score list. Unlike Tetris, Welltris is not available as a DA and includes a copy-protection scheme that requires users to refer to specific items in the manual in order to start the game.

For those enamored of Tetris, Welltris could become the new love of your life. You may find that while playing Welltris, you miss the mind-numbing, where-did-the-hours-go simplicity of your old

HP offers you the best things next

From input to output, Hewlett-Packard leads the way. With a full line of Mac-compatible printer and scanner choices.

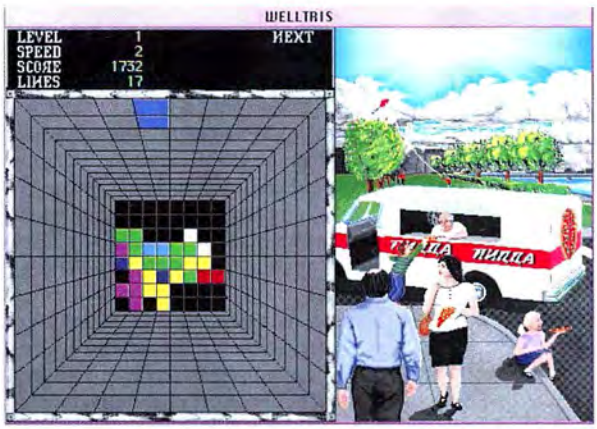
For photographic-quality scanning, there's the HP ScanJet Plus scanner. Combine that with one of HP's high-quality printers. The DeskWriter, the new LaserJet III, the LaserJet IIP, or the LaserJet IID. HP even has color printers. The PaintJet and the PaintWriter XL.

Plus, HP stands behind all their products with exceptional service and support. And a one year warranty. It doesn't get much better than that.

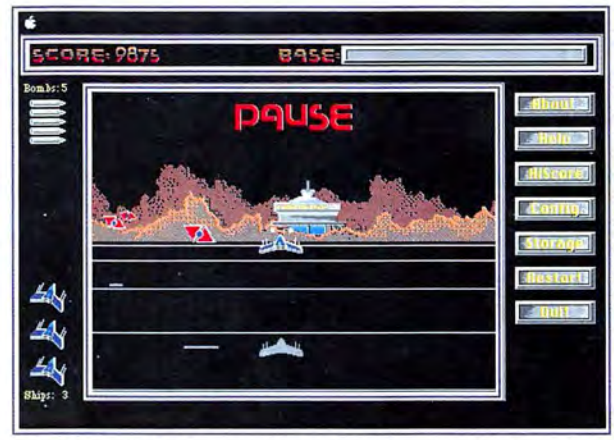
There is a better way.

HEWLETT PACKARD





Welltris is the sequel to last year's hit Tetris. Each game level in Welltris is accompanied by an illustration reflecting changes made in the Soviet Union during the period of *glasnost*. The face in the pizza wagon looks vaguely familiar . . . .

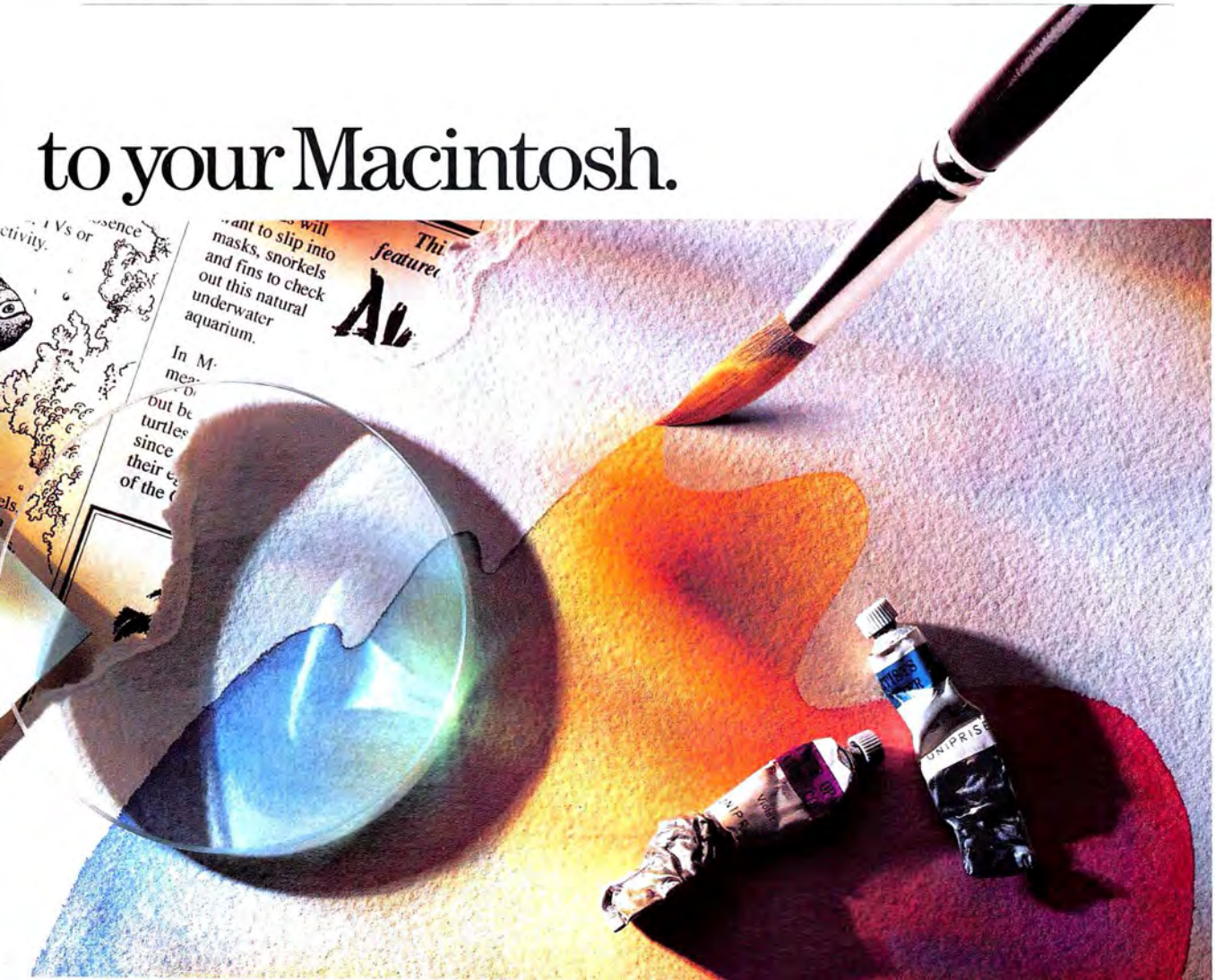


Mission Starlight is a throwback to Star Wars-type arcade games. In Mission Starlight, you swoop in low and fast, vaporizing foreign objects, while also attempting to lob missiles into the enemy power plant.

amour. This will have to be exchanged for a more challenging and less forgiving diversion. Taken on its own merits, Welltris is both thoughtful and highly addictive.

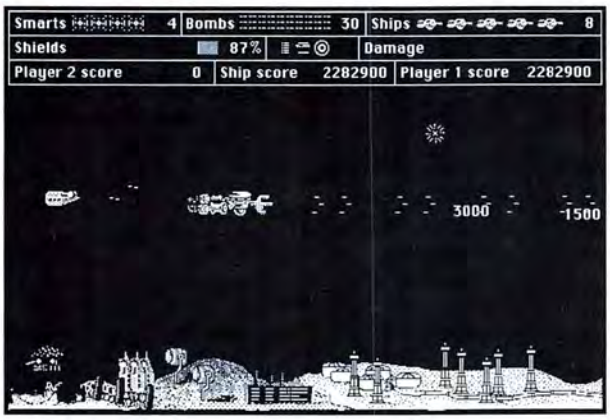
MISSION STARLIGHT Mission Starlight, from Casady & Greene, harks back to traditional shoot-'em-up arcade games. You command a starfighter vaporizing foreign bodies and power plants on five different planets. Having successfully breached each planet's defenses and knocked out all power to the force field protecting the evil base station, you then challenge the evil leader, Adolf Blitter.

to your Macintosh.



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StartUp



Sky Shadow is a take-off on several sources, starting with Defender. This isn't an errant saucepan being pursued by a mutant flying pig — it's Sky Shadow's funky flying machine, kerchunking its way across a comic landscape.

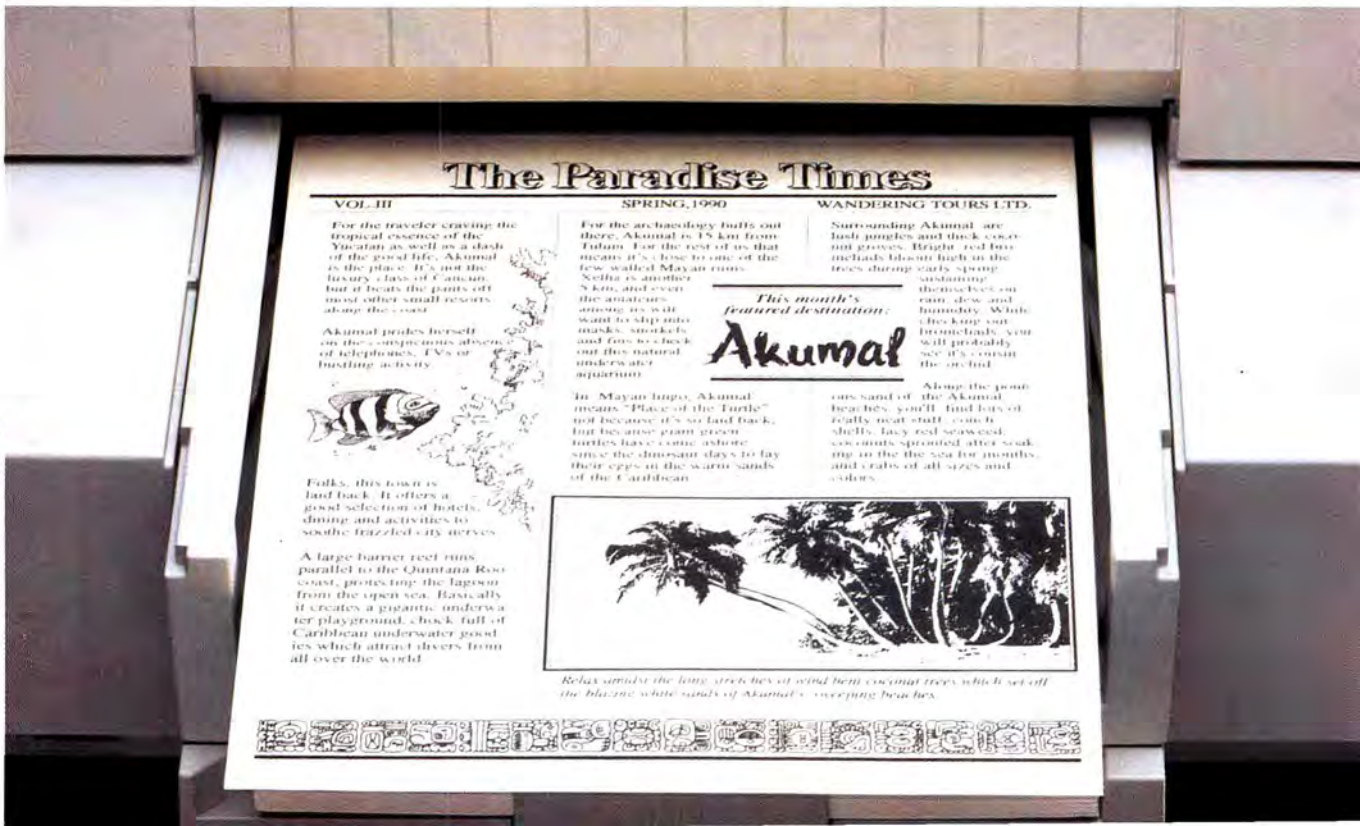
Your weapons are the usual lasers and missiles, and your enemies are geometric shapes and — happily — smiley faces.

Sound familiar? OK, we've seen it all before, but although Mission Starlight makes no real advances in the Star Wars arcade genre, the game is presented well. The ship's movements are responsive, the action is fast-paced, and the graphics are intriguing if not downright playful. Special credit goes to the creators for allowing us to hold down the assignable Fire key to get repeat action on the lasers. After all, why damage your wrist if you have unlimited firepower?

SKY SHADOW Remember Defender, the old arcade game in which your beleaguered spaceship blasts its way over a moving landscape? Take that idea, design a ship and colorful landscape owing more to R. Crumb and Krazy Kat than to George Lucas, add a boxful of hysterical sounds, force players to learn to land their vehicle, throw it all into the blender, and you've got Sky Shadow.

The premise: The dreaded Razoropers have invaded your home town. You pilot a ship resembling a piece of ancient Revere Ware and have at enemy forces on the ground and in the air. You are supplied with unlimited missiles, 30 bombs, and a protective force field. You accumulate points most quickly by accurately bombing enemy targets. To refresh bombs and supplies and to repair the ship, you must land your craft at the airstrip, a skill difficult to master at slow speed and nearly impossible in Mega-Mode (double speed and higher point values). To overcome the difficulty of landing and other obstacles to success, you can pick up various tokens that provide safe landings, continuous firing of missiles (oh, my aching wrist!), additional smart bombs, repair kits, and temporary invulnerability to attack.

With the HP DeskWriter, you can



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Documents created using Microsoft® Word and Aldus PageMaker®.
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PageMaker is a U.S. registered trademark of Aldus Corporation.

Warning: Sky Shadow is not the kind of game to be played quietly at the office. In this game, sound is everything. Important warnings and bonuses are prefaced with audible signals. As you blast away, you'll want to hear everything from the pilot's exuberant "yahoo!" that signals big points, to the whining cry of inadvertently slain compatriots. Grim perhaps, but a wonderful game nonetheless.

THE BOTTOM LINE Sky Shadow is a must-have for anyone who appreciates fast action with a sense of humor. The addition of a game editor would be welcome (why should Crystal Quest players have all the fun?). If Sky Shadow seems a little too wacky and you're the kind who likes refinement in traditional arcade-style games, Mission Starlight may be for you. If you're more at home building structures than mowing them down, Welltris offers the challenge you've been looking for. Whichever you choose, you're sure to find it more challenging and amusing than the latest Hollywood sequels.

— Christopher Breen

Get Info

Welltris ★★★★½
Published by: Spectrum HoloByte, 2061 Challenger Drive, Alameda, CA 94501; (415) 522-1164.
Version: 1.0.
List Price: $39.95.

Mission Starlight ★★★★
Published by: Casady & Greene, P.O. Box 223779, Carmel, CA 93922; (408) 624-8716.
Version: 1.1.
List Price: $49.95.

Sky Shadow ★★★★★
Published by: Casady & Greene, P.O. Box 223779, Carmel, CA 93922; (408) 624-8716.
Version: 1.02.
List Price: $49.95.

PERSONAL INFO MANAGERS

C•A•T III

C•A•T III is a tamer beast, but it's still far from domesticated.

Chang Labs calls C•A•T III "the relational database for professionals in sales, marketing and management." It's a program I've always wanted, something to manage my contacts, activities, and time. There's nothing quite like it. C•A•T is a complete "contact management" program that is far more powerful than Activision's Focal Point or anything you'd be likely to put together in Works or FileMaker. Unfortunately, C•A•T III is a brilliant solution that suffers in its execution.

A TAMER CAT Users of C•A•T 2.0 will be

have it all. (But keep it to yourself.)



The HP DeskWriter printer puts laser-quality printing right at your fingertips.

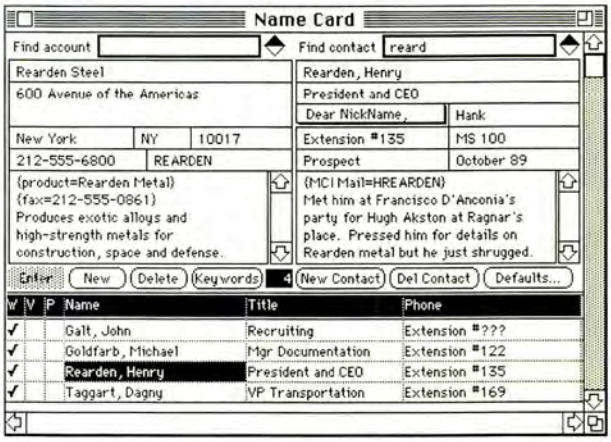
With a small size and a $995* price tag, the DeskWriter printer easily fits on your desk and in your budget. And its advanced 300 dpi inkjet technology lets you print sparkling text and detailed graphics.

The DeskWriter is also designed for easy use with your Macintosh, and has both serial and Apple Talk interfaces. It even includes scalable and outline fonts. Combine that with the DeskWriter's whisper-quiet operation, and keeping it to yourself will be that much easier. So call **1-800-752-0900, Ext. 1004** for your authorized HP dealer.

There is a better way.

HEWLETT PACKARD

StartUp



C•A•T III is a contact- and correspondence-management system that suffers from a maddening interface. In the name card, account (company) information is listed on the left and contact (individual) information is displayed on the right.

relieved to know that as arcane as C•A•T III is, it's still an enormous improvement over C•A•T 2.0, whose structure can only be described as Byzantine. C•A•T 2.0 was simply the most user-unfriendly Macintosh program I've ever encountered. To its credit, Chang Labs must have listened to its users — if only it had listened more carefully.

The first little sign of trouble occurs when you launch the program. You're presented with a "name card" onto which you enter information on your "accounts" and "contacts." With flat-file managers, you're never quite sure how to handle multiple contacts at a single company. Making a separate entry for each person wastes time and space, but trying to cram more than one individual's name and extension into a single company entry is seldom satisfactory. Because C•A•T is a relational database, each account (a mailing address, which is typically the company's location) can have an unlimited number of contacts, or individuals. You can have as many as 16 pages of notes for each account and for each contact associated with that account. In addition, there are two user-definable fields for each contact, and the note fields for contacts and accounts can contain an unlimited number of keywords.

The keyword feature is great. A car salesperson might enter a line such as "{present car=Honda Civic}" in a prospect's contact notes and later create a standard letter that included a line such as "We can give you top dollar when you trade in your «C:present car»." The *C* identifies the keyword as coming from the contact notes. *A* identifies account information, and *D* identifies "document" information, such as the time or date of your last letter to the contact. Of course,

With the HP ScanJet Plus, you've

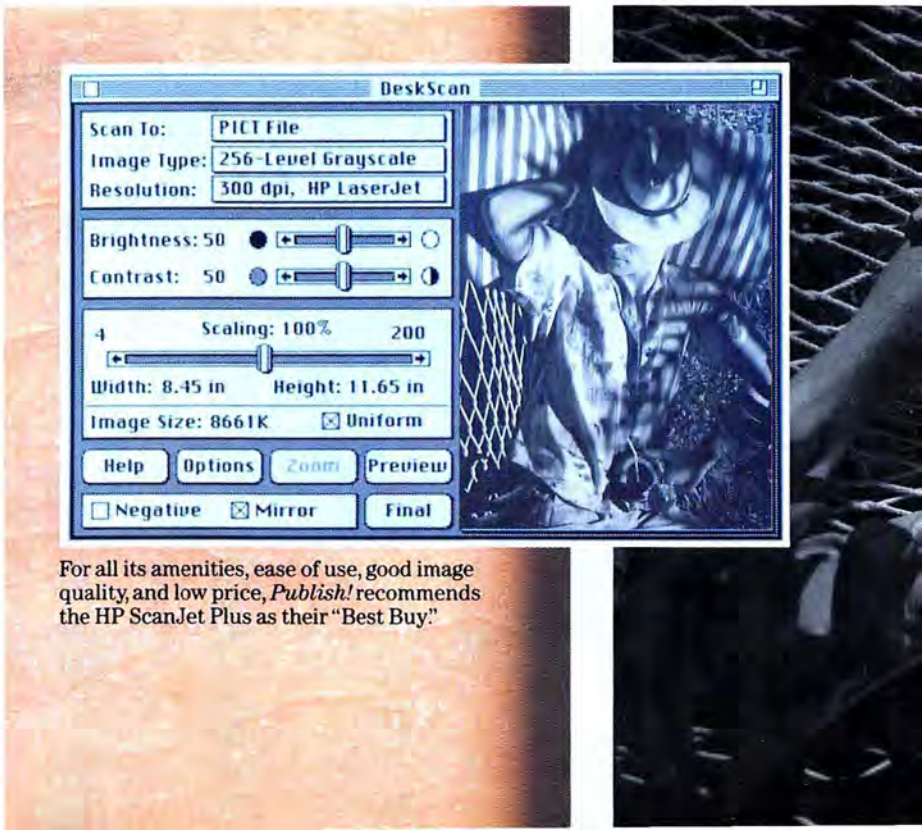
The HP ScanJet Plus scanner provides 8-bit photographic-quality scanning.

That means 256 shades of gray for the hottest-looking output from your Mac. And it's so easy, too. At the click of a mouse, you can get negative or mirror images, as well as scaling in 1% increments from 4-200%. All for $2,190,* about what you would expect to pay for a 4-bit scanner.

So if you want the richest, most detailed images from your Mac, you've got it made with Hewlett-Packard. Call **1-800-752-0900, Ext. 1005** for your authorized HP dealer.

There is a better way.

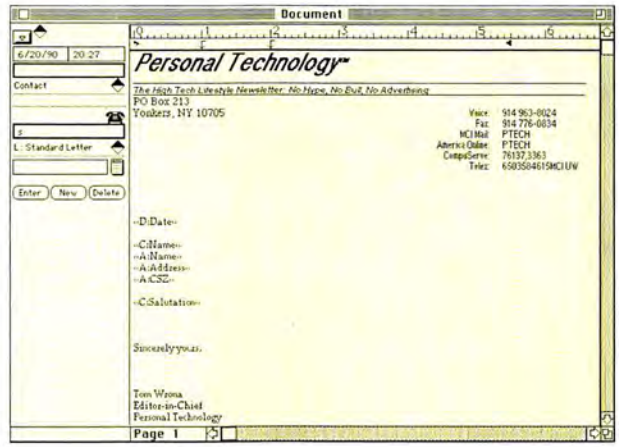
HEWLETT PACKARD



For all its amenities, ease of use, good image quality, and low price, *Publish!* recommends the HP ScanJet Plus as their "Best Buy."

you can also paste information from any of the name card's fields into your letters.

You can write letters with C•A•T's built-in word processor. It's much improved from earlier versions, permitting full control over fonts, justification, page breaks, and line spacing. But it's still limited. Like many other Mac users, I have what I call a run-time letterhead. My letterhead is actually a first header in a Word 4.0 document. I keep plain paper in my printer, and the letterhead prints with the letter. Previous versions of C•A•T couldn't perform this simple feat. C•A•T III does, but imperfectly. Because it lacks Word's Paragraph Borders command, I couldn't duplicate my letterhead exactly. More importantly, C•A•T's word processor lacks many features I've come to take for granted, such as styles, style sheets, headers, footers, footnotes, hyphenation, columns, tables, and a spelling checker. The maxim that integrated programs are always weaker than stand-alones holds true with C•A•T.



Typing an individual's name in C•A•T's Contact box replaces the variables in this standard letter template with your contact's account and contact information.

Unlike most word processors, C•A•T lets you create drawings. With the integrated drawing program, you can prepare not only artwork but also forms and reports. That's because boxes drawn with the box tool can capture data from the database. You simply select a box and click on the Paste Ref option. You click on a radio button to specify which kind of data you want (the aforementioned account, contact, or document type) and proceed to choose the reference from a pop-up list. What's more, boxes can have names and can be set up to calculate simple math. The Total box of an invoice can have a formula such as "Total=Subtotal+Tax+Shipping."

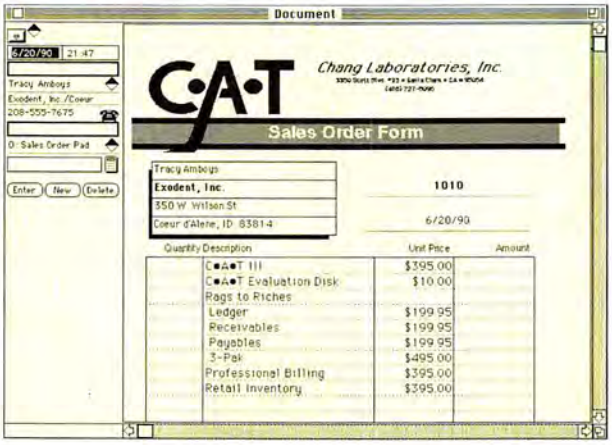
Everything you create is stored relationally, so you can call up in a few

got it made in the shades.



*Suggested U.S. list price. © 1990 Hewlett-Packard Company PE12004

StartUp



C•A•T's drawing and text tools let you create sharp-looking documents such as this order form. Boxes can contain database information and calculated fields.

seconds a letter you wrote months ago; letters can have "tactics" that automatically generate follow-up letters after a specified number of days; there's a glossary for storing frequently used text and draw objects; and the program can even dial the phone for you.

AN INDEPENDENT CAT So what keeps C•A•T from receiving a higher rating? There are a lot of little things, added to a few big things such as problems with the documentation and the interface. I had a hard time figuring out how to make things work properly. The program still has its predecessor's counterintuitive feel that only a programmer could love. It violates Apple's Human Interface Guidelines with Save boxes labeled Enter instead. If you innocently browse to another name card before clicking on an Enter button, your changes will be lost without warning. You can't see the full width of your documents on a regular screen. The manuals are confusing, incomplete, and contradictory.

THE BOTTOM LINE C•A•T is a most appropriate name for this most feline of programs. Like a cat, it's intelligent and powerful as well as solitary, difficult to figure out, and maddeningly indifferent to humans.

— Tom Wrona

Get Info

C•A•T III ☤☤☤
Published by: Chang Labs, 5300 Stevens Creek Blvd., San Jose, CA 95129-1088; (408) 727-8096.
Version: 1.0.
List Price: $495.

Pigments for your imagination.

HP color printers let you draw splashy color from your Macintosh.

Entertain your thoughts with HP's PaintJet and PaintWriter XL color printers. Both are fully Mac-compatible and let you use all Quickdraw-based software applications. That means high-quality Macintosh II output in 16.7 million colors.

Print on paper or transparencies with 13 scalable outline fonts. And for shared use, the PaintWriter XL offers AppleTalk, faster speed, and auto sheet feed. For sample output and the name of your authorized HP dealer, call **1-800-752-0900, Ext. 1167.**

There is a better way.



HEWLETT PACKARD

Rumor Manager

Gossip, Guesses, and Goings-On

With System 7 still somewhere on (or over) the horizon, major software developers are taking it relatively easy and are considering their options — including the less-capable Windows 3.0. Hardware advances, therefore, continue to dominate the grapevine. Look for some of the new zoned drives to be available in Mac configurations shortly. If you haven't heard of zoned drives, they're optical storage media that contain separate areas with separate abilities. For example, a zoned drive might have a CD-ROM area with 50 megabytes of applications and data and another area with 100 megabytes of WORM storage, while the third zone contains 100 megabytes of erasable optical storage. Because each zone has advantages and disadvantages, you use the area that is best suited for a particular project.

Zoned media and drives appeal to the large software-publishing companies. Aldus, for example, could distribute Persuasion, FreeHand, and 40 megabytes of good clip art at little more than the cost of a standard CD-ROM. Users would get not only the art and applications but also several hundred megabytes of storage. Zoned media and drives should not be too expensive and could be the standard storage/distribution device by 1993.

Apple is about to take another leap in the microcomputer speed races. No, the wicked-fast 62-megahertz IIfx (which is coming) won't be it. The next great racer will be something called a displayless processor. If the need to create and update screen images is removed, life on the motherboard will really move faster.

Although this technology isn't new, no commercially released Mac has ever used it. The reasons are severalfold, but the most important is that virtually no software can currently work with it. Applications will have to be specially written or modified. The performance benefits for massaging very large amounts of data, however, are large enough to warrant special versions of spreadsheets and CAD programs.

The displayless Mac will be expensive and not available through the regular dealer chain. It will be sold by Apple's National Accounts Group and selected U.S. and overseas Apple Centers.

Many developers are hard at work creating all the utilities that will be needed to "plug" the gaps in System 7's functionality. Among the more interesting are some font-modification tools and advanced virus-protection and -eradication tools.

■■■■

Our U.S. Mail address is Rumor Manager, c/o *MacUser*, 950 Tower Lane, 18th Floor, Foster City, CA 94404. Our electronic addresses are MacUser (on MCI Mail) and 72511,45 (on CompuServe). No calls, please.



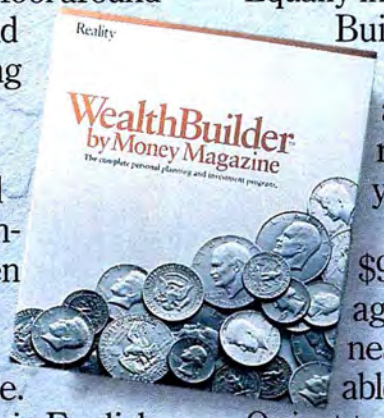
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Reality TECHNOLOGIES

BUYER'S GUIDE

MacUser

PostScript Printers

MacUSER LABS

No peripheral is as important as your printer. No printer is as powerful as a PostScript printer. And as Adobe PostScript faces challenges from Apple and the clone makers, no purchase is as filled with uncertainty as a printer purchase. Will Apple's TrueType make PostScript unnecessary? Can the new low-cost printers match their expensive ancestors? Can you trust a clone? This month, *MacUser* answers all your PostScript-printer questions — whether you're looking for a personal printer, a network-horse, or an addition to your DTP shop.



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PostScript® laser printers used to be expensive, large and shared by the entire office.

Until now.



microLaser™ from Texas Instruments: the affordable PostScript printer you can call your own.

Finally, for less than $3,150,* you can have a true Adobe® PostScript laser printer right at your own desk. TI introduces its new microLaser – the perfect partner for your Macintosh®.

Small size. Lots of value.

When you place this printer next to your Mac, you'll be impressed by its small size and compact design. At only 13.4 inches wide and 14.2 inches deep, microLaser may be the small kid on the block, but it packs plenty of punch. This six-page-per-minute printer takes full advantage of virtually all of the software that runs on your Macintosh. That's because it uses the Adobe PostScript language, offers 35 PostScript typefaces, 1.5MB of memory and an AppleTalk® Interface.



If you also use MS-DOS® Computers, you can switch between the PostScript language and standard HP LaserJet® Series II emulation easily without turning off the printer.

True Adobe PostScript.

Because microLaser features the PostScript language, you can print fonts in a variety of typestyles, sizes, and orientations by scaling and rotating them to meet your exact specifications.

The PostScript language also gives you more graphics power so you can print precise lines and smooth curves. Integrating text and graphics is easy, and the microLaser can print even your most sophisticated page layouts and illustrations.

What's more, the PostScript language is the industry standard for higher resolution output devices. So you can proof your documents on the microLaser, then print on any typesetter with PostScript capability without recreating the document.

Capabilities that grow as your needs grow.

One of the best things about microLaser is that you only buy what you need. Memory is upgradeable in 1MB increments up to a total of 4.5MB, and you can upgrade it yourself, without tools or technicians. All you have to do to get additional fonts is download through software or plug optional microCartridges into two credit card-size slots.

Superior paper handling.

Part of what makes microLaser a truly personal, desktop laser printer that takes up so little room is its paper drawer, which slides inside. Because microLaser holds 250 sheets standard (it holds 500 when you add an optional paper drawer), you spend less time refilling paper and more time creating superb-looking documents.

This printer also handles a variety of paper sizes and types – from letter, legal, and executive to transparencies, labels and envelopes. For those times when you're facing a large mail merge task, just plug in an optional envelope feeder to alternate between letters and envelopes.

Your own PostScript printer is a call away.

To find out more about how you can have affordable PostScript printing for your Macintosh, call today.

1-800-527-3500.

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At just half the footprint of the HP LaserJet III, microLaser PS17 not only offers 17 scalable fonts (LaserJet III offers eight), they're *PostScript* fonts – the industry's standard for high quality. That means more than 4,000 software programs take advantage of microLaser's PostScript font capabilities.

Plus, microLaser PS17 offers the same superior paper handling as other microLaser models, is easily upgradeable and comes at a desktop price.

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*TI suggested list price of microLaser PS with an AppleTalk interface. **TI suggested list price for microLaser Model PS17.

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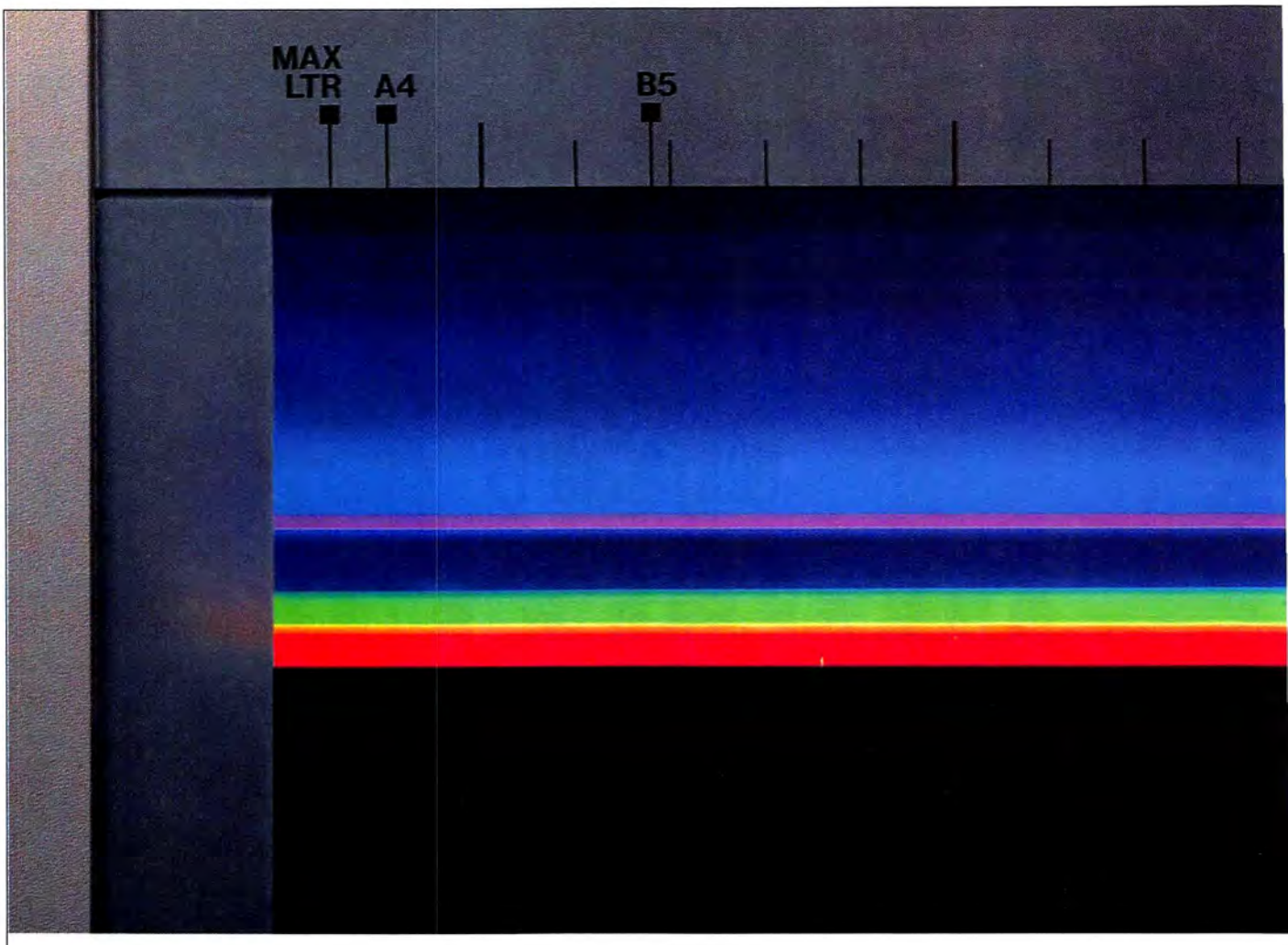
Whoever you are — a single user, a corporate buyer, or a desktop publisher — choosing the right PostScript printer is a tough business.

BY BRUCE FRASER, PAUL YI, AND THE MACUSER LABS STAFF

PHOTOGRAPHY: FRED STIMSON

When the printing job gets tough, the tough go shopping — for a PostScript printer. And for good reason: A printer that's equipped with Adobe PostScript (or a competing clone) produces the highest-quality text, graphics, and images you can get from the desktop. As PostScript celebrates its fifth birthday, the range of printers that use it continues to expand. You can find PostScript in inexpensive personal printers and in professional imagesetters, in both black-and-white and color printing. But PostScript and its clones have made perhaps their greatest impact on those devices usually lumped together under the name *laser* printers.

Fast, versatile, and increasingly inexpensive, such printers — whether they use actual lasers, liquid-crystal shutters, or LEDs (light-emitting diodes) — have made daisywheels obsolete and have relegated dot-matrix printers to second-class status (see "Fit to Print," September '89, page 178). As printers and printer features proliferate, the job of choosing the right printer for your individual needs becomes correspondingly more difficult.



When we sat down to
all the lights

Accurate color scanning seems a simple enough goal. Yet in a flash of engineering brilliance, Epson® designers have raised the standard by creating the ES-300C color scanner.

Using three separate light bars, Epson's innovative TruePass™ scanning system, does in one pass what most other color scanners require three passes to accomplish.

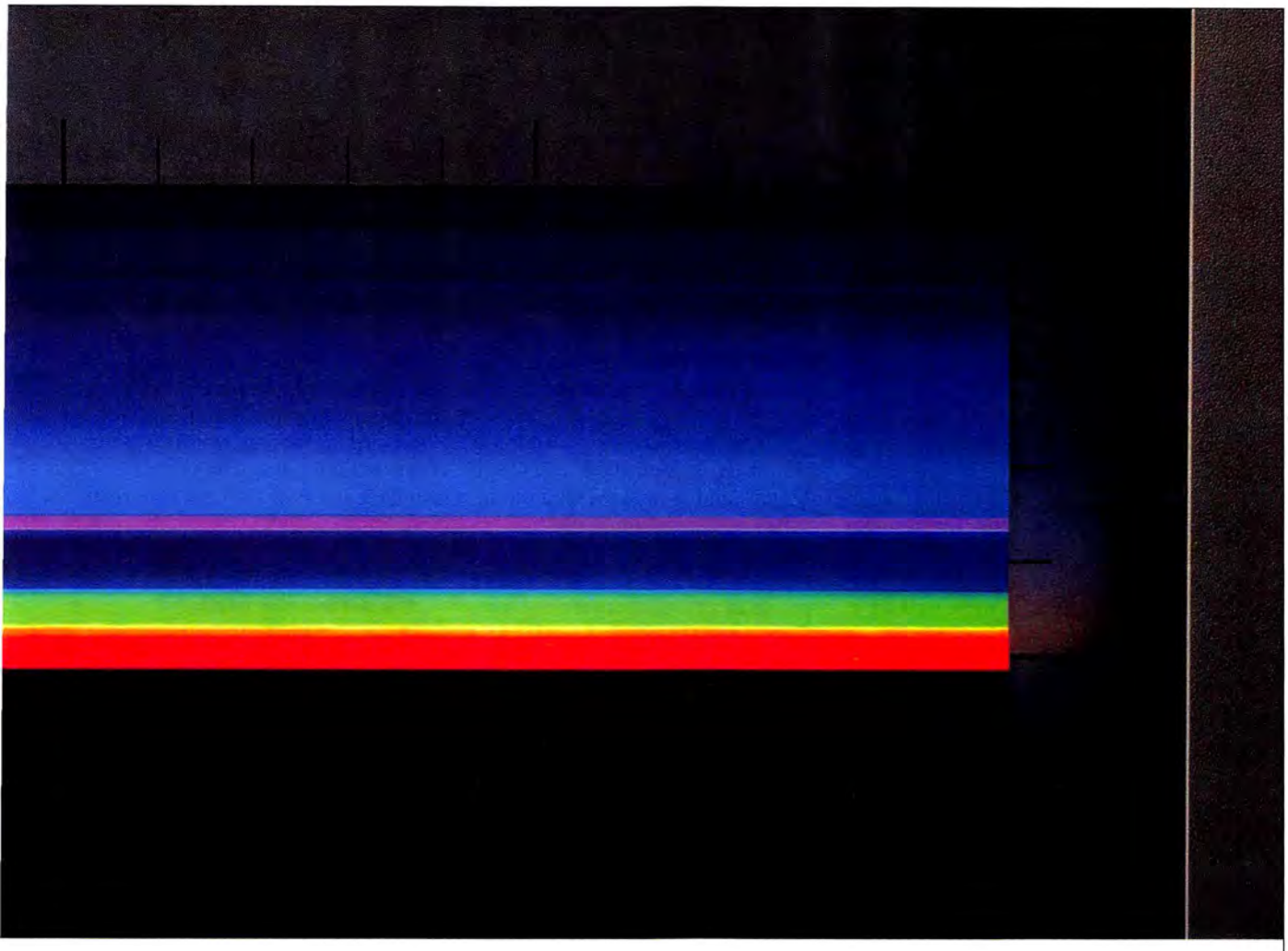
The result is more precise images in less time. Gone are registration difficulties, poor fidelity and color dropout.



The new EPSON ES-300C is both MACINTOSH and MS-DOS compatible.

The ES-300C is as impressive in black and white or grayscale as it is in color. 256 shades of gray complement 16.8 million colors. Resolution settings can be

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design a better scanner, ame on at once.

adjusted between 50 and 600 DPI to optimize output from any printer, or to any monitor. Compatibility is assured with a choice of easily installed Macintosh® or MS-DOS® interface kits, featuring the latest industry-leading scanning and editing software.

With a price as attractive as its image would suggest, the full color ES-300C costs about the same as most black and white scanners.

A demonstration of the Epson ES-300C will be an illuminating experience. Other scanners simply pale by comparison.

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That's where we come in. MacUser Labs spent thousands of hours dissecting 19 of the most popular PostScript (and clone) laser printers available in today's Mac market. We discovered that in the world of laser printers, one size definitely does not fit all.

Do you need a printer for your own personal Mac? If so, an easy-to-use bargain buy is probably your bottom line — and it should be small enough to sit on your desk too. Or are you buying for your company? Then you want a workhorse that fits on the network, one that's easy to feed with paper and that can handle a lot of output. Or are you setting up a desktop-publishing operation? What you need is a well-rounded performer but one that's also compatible with your service bureau's equipment.

Regardless of what kind of user you are, we're here to arm you for your foray into the printer-buying fray. As we tested each printer for image quality, speed, ease of use — and, for the clones, true PostScript compatibility — we asked ourselves: Who could best use this particular printer? Is this one perfect for one type of user but inappropriate for another?

We kept these questions in mind as we took a first look at the latest technologies and as we revisited old favorites — and some old not-so-favorites. We tell you what we looked for and how we looked for it, and we spotlight the results for the three types of shoppers listed at this article's outset. (We also gave the same MacUser Labs treatment to five new bargain models that weren't shipping at the time of this review — see "The Next Wave of Personal PostScript Printers," following this report.)

Overall, the news is good: No matter who you are, there's a laser printer for you. If you're positive that you fit the profile of one of our three user types, feel free to skip to the specific sidebar describing the printers that fit your needs. However, if you're a first-time buyer, skeptical of taxonomy, or interested in the latest developments in the PostScript-laser-printer market, you'll want to keep reading. But don't worry — whether you skip ahead or read right through, we'll help you ask the right questions to get the best answers.

PostScript: Who Needs It?

Good question. If you've never owned a PostScript printer, you may hope you can save yourself the expense of getting one. Maybe you can: There are ways to improve the output of a non-Postscript printer.

All printers put a pattern of dots onto a page, be it by pin and ribbon or

Living with TrueType and System 7

When System 7 ships, Mac users will have the distinct pleasure of playing with some new tricks at the System level — from a more curious Finder to more intelligent multitasking. One of the latest and greatest innovations will be TrueType, Apple's new font-rendering technology.

With TrueType, smooth QuickDraw screen and printer fonts will be daily desktop fare. Apple claims that these fonts will be superior to Adobe's Type 1 fonts, ATM or no ATM, because TrueType fonts are described by quadratics and PostScript fonts are described by cubics (quadratics and cubics define the curves used in font design). The result? TrueType, with its new rasterizer, will be faster. If that explanation leaves you cold, you may be positively frozen by the smart guy in the back row who wants to know just one thing: Will TrueType work on PostScript printers?

He had to ask. Fact is, according to Apple, not only will it work — why were you so worried? — but it will work transparently, in the same way as fonts are downloaded today. Recall that when a PostScript printer doesn't have a specific font available in its ROM, it asks for the font from your Mac's System Folder and then downloads it over AppleTalk into the printer's RAM. Or if the printer is attached to a SCSI drive holding the fonts, it gets the fonts from there. TrueType will add one wrinkle to this process: If the printer can't find a TrueType font in its ROM and can't substitute an equivalent one, it will download the font outline *as well as the TrueType rasterizer's software* into its RAM and will work along with the Adobe PostScript-font rasterizer. It remains to be seen just how efficient this process will be.

It remains to be seen too what it will mean to have two font standards competing head-to-head. And the wise guy in the back row also wants to know if service bureaus will need two full sets of fonts to keep everyone happy? That's a good question. Will there be differences in font metrics (dimensions) and kerning between TrueType fonts and Type 1 fonts of the same name? That's another good question.

Wise guys can take heart in announcements such as that made by Bitstream that it'll make TrueType fonts with the same metrics and



1. You tell your Mac to print a page containing the Helvetica font on your PostScript printer.
2. The Mac checks to see if the printer has Helvetica in its ROM or RAM or on an attached hard disk.
3. If it does, the printer says "Yes" to the Mac.
4. The Mac sends the page, and the printer uses its resident Helvetica to print the page. The printer always uses its resident Helvetica, whether you use a bit map, TrueType, or Adobe Type 1 Helvetica.

by light and toner. Creating this *bit map* is called *raster image processing*, or "RIPing," the page. Inkjet, dot-matrix, and some low-end laser printers currently use QuickDraw — Apple's display manager and *page-description language*, or PDL. These QuickDraw printers output an image of the screen document that has been RIPed by the Mac's processor for both text and graphics.

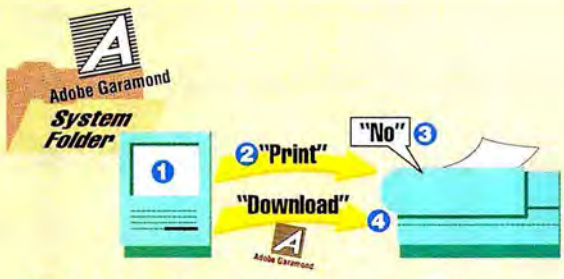
In most cases, PostScript is faster than QuickDraw at RIPing. A laser printer using Adobe's PostScript PDL — or a PostScript clone using a variant of it — does its own RIPing by interpreting a mathematical description of the page sent from your Mac in PostScript code. It does this with its own processor — a mixture of hardware and software called the *PostScript interpreter*. Because the printer does most of the processing, it both frees up your Mac and is freed *from* it. PostScript printers and clones — unlike QuickDraw printers, which rely on your Mac's processor — can therefore be networked. Just as important, though, is PostScript's effect on the printed image: Its resolution can be as high as your printer's interpreter can manage — 300, 600, or even 1,200 dpi (dots per inch).

For higher-quality text output on QuickDraw printers, you can use ATM (Adobe Type Manager) for printing PostScript Type 1 fonts (which are optimized for better output at low resolution and smaller point sizes). ATM gives you good-quality text, especially at odd point sizes, but it doesn't let you print PostScript graphics. For printing PostScript text *and* graphics on any non-PostScript printer, you can turn to software-only PostScript interpreters, such as TScript from Teletypesetting and Freedom of Press from CAI. But be prepared: Your Mac will be tied up for much longer periods than is usual for QuickDraw printing, and none of these solutions free your Mac from RIPing.

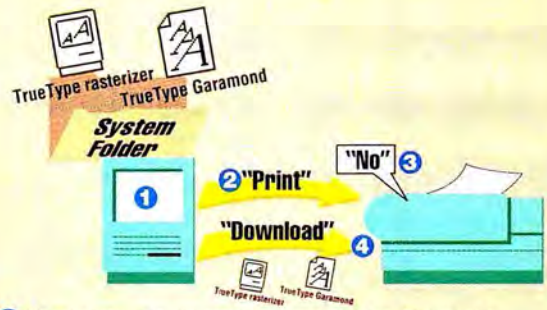
Which brings us back to the PostScript option, an issue further complicated by the fact that PostScript clones now compete head-to-head with Adobe-sanctioned printers. What's more, Apple will soon be among the clone makers, because the Microsoft TrueImage PDL, a PostScript variant, will be built in to future Apple laser printers. (See the "PostScript Evolution or Revolution" sidebar in "The Next Wave of Personal PostScript Printers.") To add to the confusion, Apple has announced that it will include its new TrueType QuickDraw font-rasterizing and -outlining technology in its upcoming System 7. In the future, Apple laser printers will use TrueType fonts kerning as existing Bitstream Type 1 fonts. Buyers of PostScript printers will also be comforted by the probable release of utilities that will convert Type 1 fonts into TrueType ones — and vice versa. What's more, PostScript diehards will be glad to know that Adobe has promised that Adobe Type Manager — which not only improves output on QuickDraw printers but also improves screen fonts on your Mac for PostScript work — will be compatible with System 7.

In the meantime, don't wait until all the vendors are happy before you go out and buy your laser printer. With enough wise guys around asking questions, even unhappy bedfellows such as Apple and Adobe will continue to accommodate each other.

— Michael Miley and Paul Yi



1. You tell your Mac to print a page containing Adobe's Type 1 ITC Garamond font on your PostScript printer.
2. The Mac checks to see if the printer has Garamond in its ROM or RAM or on an attached hard disk.
3. If it doesn't, the printer says "No" to the Mac.
4. The Mac downloads Garamond to the printer's RAM, along with the page to be printed. The printer then uses the downloaded Garamond to print the page.



1. You tell your Mac to print a page containing Bitstream's TrueType ITC Garamond font on your PostScript printer.
2. The Mac checks to see if the printer has ITC Garamond in its ROM or RAM or on an attached hard disk.
3. If it doesn't, the printer says "No" to the Mac.
4. The Mac downloads Garamond and the TrueType rasterizing software to the printer's RAM, along with the page to be printed. The printer then uses TrueType to print the downloaded Garamond.

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POSTSCRIPT

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NEC

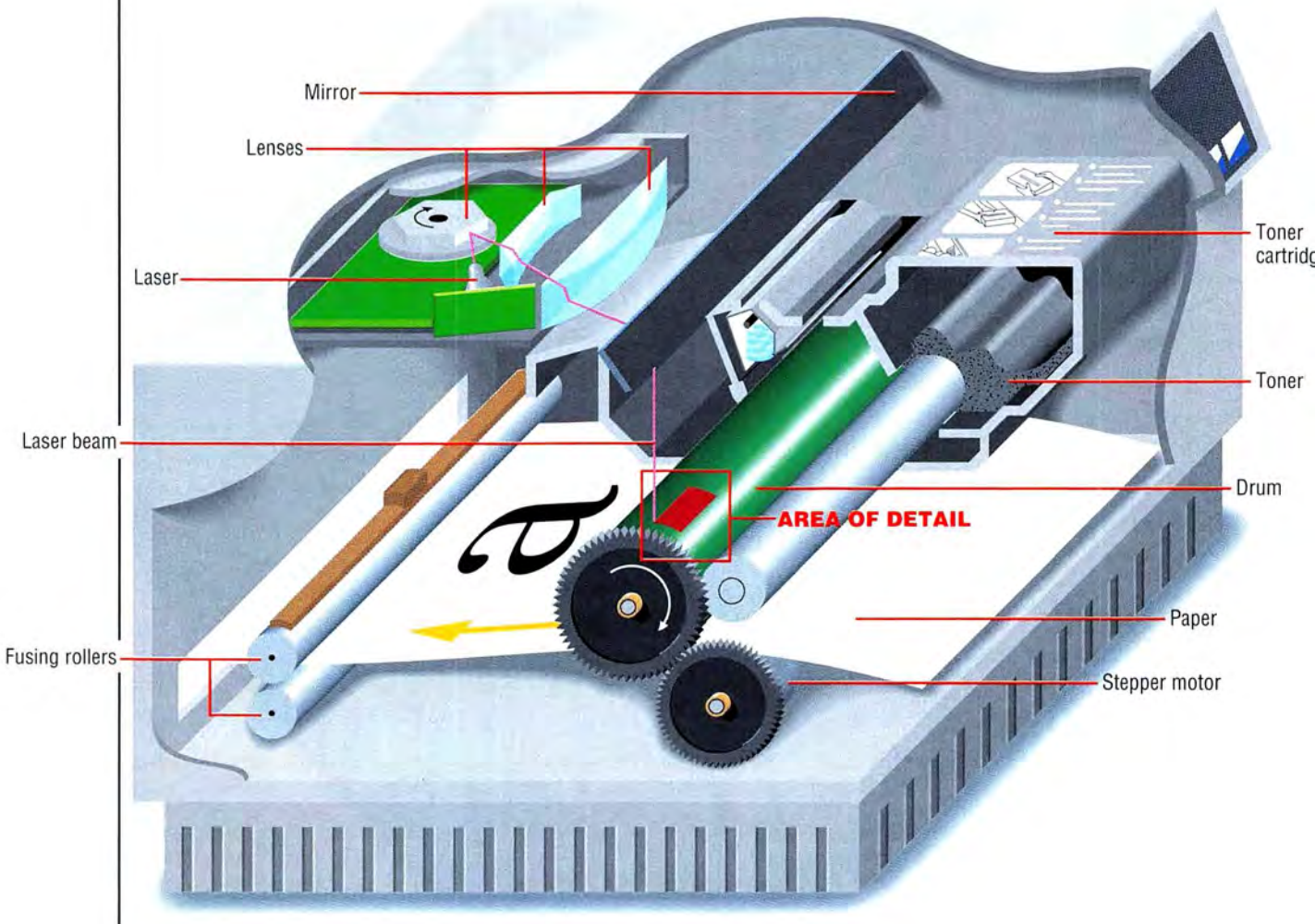
How It Works: Enhanced Resolution

Four of the printers we tested use different combinations of three techniques to increase the resolution of their laser-printer engines. The Printware 720 IQ Professional Laser Imager, the LaserMAX 1000 Personal Typesetter, and the NewGen TurboPS/480 boost their resolution to well above the original specifications. The HP LaserJet III boosts its resolution selectively to reduce the jaggies. All use varying implementations, but the underlying principles are the same.

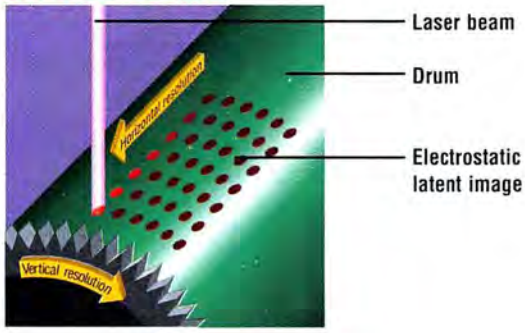
To understand how laser printers boost their resolution, you have to know a little about how they work. A single laser beam scans across a photosensitive drum in patterns of electrical charge. The drum has a negative charge. A series of mirrors directs the beam onto the rotating drum while the laser is turned on and off. When the laser strikes the drum, it creates a spot with positive charge. The laser is turned on to print a dot and left off where there is no dot. The laser beam "writes" a horizontal line of positively charged dots along the surface of the drum. Negatively charged toner particles jump to the dots on the drum written by the laser beam.

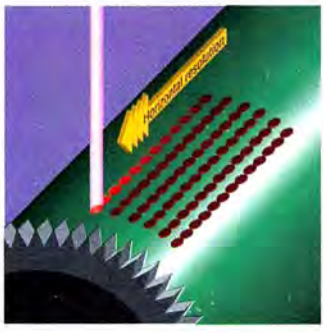
When the laser has written a complete horizontal scan line to the drum, a stepper motor rotates the drum slightly to receive the next line, and the process is repeated until the complete image is recorded on the drum. Positively charged paper then passes through the printer and attracts the toner from the drum. As the drum rotates, the image is transferred onto the paper. Finally, the paper passes between heated rollers that fuse the toner to the page.

Turning the laser on and off faster produces more dots, spaced closer together along a horizontal scan line. Reducing the laser's intensity reduces the dots' size, yielding higher horizontal resolution. To increase the vertical resolution, the stepper motor is tweaked to move the drum in smaller increments; the horizontal scan lines move closer together.

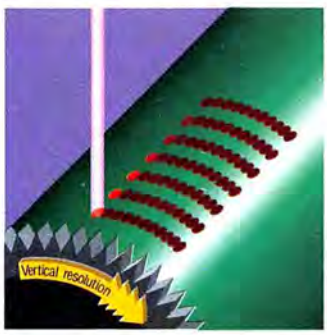


AREA OF DETAIL





Horizontal Enhancement
Turning the laser on and off faster produces more dots, spaced closer together along a horizontal scan line. This results in increased horizontal resolution. Reducing the intensity of the laser makes the dots smaller and gives thinner lines and smooths curves.



Vertical Stepper-Motor Adjustment
The stepper motor is adjusted to move the drum in smaller increments, making the horizontal scan lines closer together. The practical limit of this technique is around 600 lines per inch, which results in 600-dpi vertical resolution.



Shifting the Laser Vertically
Vertical resolution is further enhanced by shifting the vertical position of the laser beam while also moving the drum in smaller increments. The horizontal scan lines are even closer together.

Output Examples*



Apple LaserWriter IINTX
This output is the best sample an unenhanced 300-dpi laser printer can produce. The Canon engine yields a good-looking character, but once enlarged, the character isn't smooth and the dots making up the character are visible.



Hewlett-Packard LaserJet III
HP tweaks the laser dot size and placement to smooth text in the curves and joints. The LaserJet III is still only 300 dpi, but the variable laser beam produces a better-looking character than does the untweaked 300-dpi engine. The dots that make up the character are still visible.



Varityper VT600P
The Varityper gives an improved resolution of 600 dpi by horizontal enhancement of the laser beam and adjustment of the vertical stepper motor. The character looks smoother and less jagged than the untweaked 300-dpi character.



Printware 720 IQ
The Printware 720 IQ has improved engine resolution of 1,200 x 600 dpi. The character looks smoother and better defined than untweaked 300-dpi characters. Printware uses the most extreme horizontal enhancement of the laser beam.



LaserMAX 1000
LaserMAX has tweaked an engine to an improved resolution of 1,000 x 1,000 dpi. It adjusts the stepper motor and shifts the laser beam in a vertical direction. The text is smoother, and the curves are better defined.

*12-point text enlarged ten times.

OPTICAL STORAGE HASN'T LIVED UP TO ITS PROMISES EITHER.



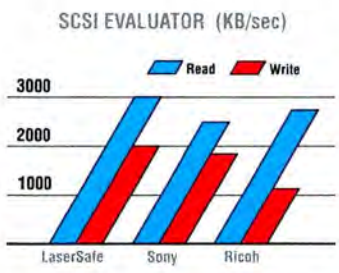
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Magneto optical drives have been a letdown. People thought they'd be fast (among other things); yet they're still too slow for even backup and on-line archiving. Well, you won't be disappointed anymore. Because the makers of Bernoulli® products are giving you the MO you've been waiting for. The Iomega® LaserSafe.™

With the new LaserSafe, a fast MO is no longer an optical illusion. In addition to a 256KB, on-board, dual-ported caching system, LaserSafe utilizes an advanced technique called "asynchronous write." By freeing the Mac from waiting for the write operation, LaserSafe can nearly double your throughput. An Iomega first that raises the level of MO performance, making LaserSafe the fastest MO for your data-intensive storage applications. The difference is clearly visible.

The LaserSafe is a 650MB optical drive that's actually easy to use, too. It allows you to partition disks for easier file management. And it's the first MO that gives you off-line disk formatting, saving you up to 40 minutes per disk of otherwise wasted time. But more important, LaserSafe uses the same simple software interface for which Bernoulli is known.



LaserSafe was designed with an attention to detail unlike any other MO. Worldwide agency approvals, a sealed mechanism and positive airflow filtration set the industry standard for reliability and data integrity. And LaserSafe has convenient, external termination, 110/220 voltage switching and SCSI ID — no panels to open, no resistors to remove, no hassles.



Above all, LaserSafe is made by the company that wrote the book on removable storage. The company that has an installed base of over 600,000 drives with 98 percent customer satisfaction. A company that will be there to support you in the future.

So get the rest of the LaserSafe picture. **Call 1-800-289-4034 for free literature** and specs (not the X-Ray kind). Look into it today. Because what you're really looking into is the future of optical storage.

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and the TrueImage PDL.

What's at stake here? A lot. Will Adobe PostScript continue to coexist with PostScript clones? Will both survive the coming of TrueImage? Or with Apple's move to TrueType, will all PostScript printers, both Adobe and clone, soon be on the endangered-species list?

Don't worry, keep printing. The good news is threefold. First, PostScript clones are becoming more compatible with Adobe PostScript and are getting faster and cheaper. Second, PostScript itself continues to evolve. Adobe has published some of its PostScript specs for the printer industry, encouraging clone manufacturers and furthering Type 1-font compatibility. Adobe PostScript itself has recently evolved to Level 2, with color and compression built in — it's a living language. And third, Apple assures us that TrueType will be compatible with PostScript printers (see the "Living with TrueType and System 7" sidebar).

In short, PostScript is still the sun around which laser printers revolve. The fierce competition and the ensuing drop in printer prices make this an excellent time to buy a PostScript printer, or even a clone, without fear of such a printer's becoming obsolete. Indeed, PostScript clones remain a viable option for one primary reason: Their price/performance ratio is usually very competitive with that of their Adobe-sanctioned brethren. If, however, you're looking to save money by buying a PostScript clone, be aware that some true Adobe PostScript printers, particularly the Texas Instruments microLaser PS35 and the Hewlett-Packard LaserJet IIP, are now cheaper than some clones (although the IIP's speed leaves something to be desired).

That's not to say that problems don't persist with the current crop of clones in the area of font handling and, to a lesser extent, with PostScript applications such as Adobe Illustrator and Aldus PageMaker. For instance, although most PostScript clones don't have a problem with Type 3 PostScript fonts, they do have a problem interpreting Type 1 fonts, which are encrypted. Adobe's recent publication of some Type 1 specifications should help change this situation. Type 1 fonts, the current industry standard for type libraries, contain

Figure 1: Jury Results

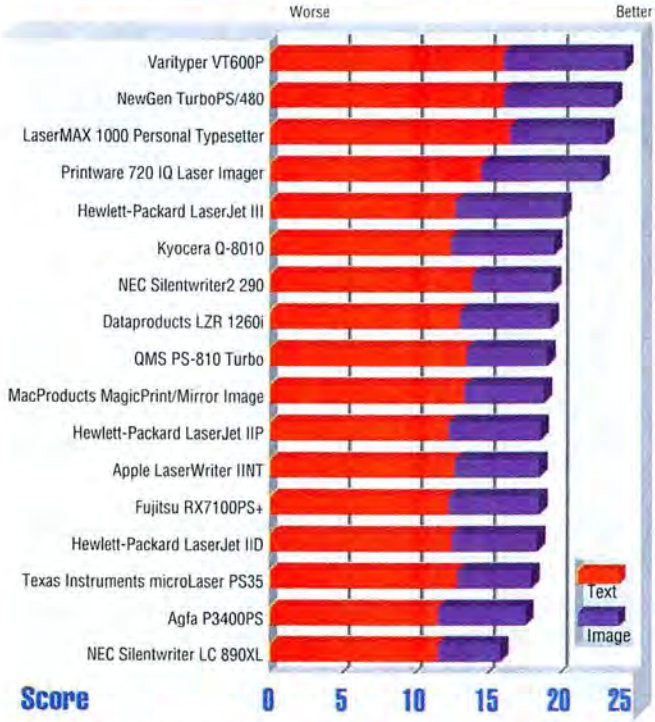


Figure 1: Our crack staff of jurors rated each printer's quality in the areas of text, gray scale, line art, and PostScript art. The combined and averaged results are shown, with the text results highlighted. The Varityper VT600P finished on top, despite stiff competition from the enhanced-resolution printers. The NEC Silentwriter2 290 consistently brought up the rear, with the worst image quality. The Hewlett-Packard LaserJet III had a slight advantage over the other 300-dpi printers.

Figure 2: Line Resolution

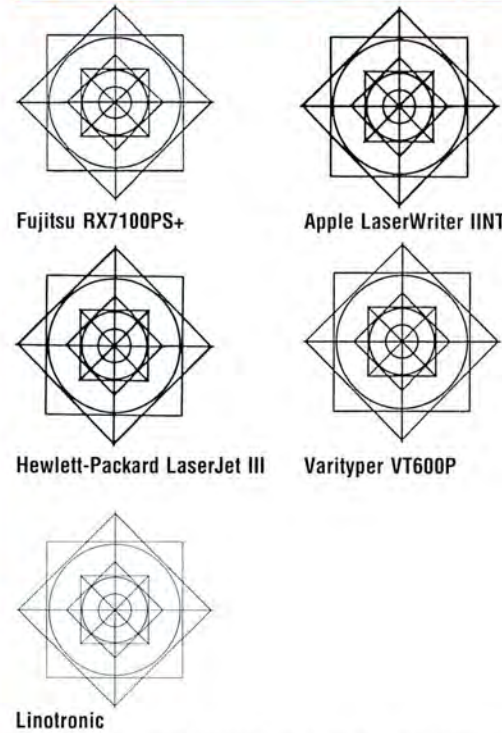


Figure 2: The criss-crossed circle tests line resolution. The 300-dpi Fujitsu RX7100PS+, with its LED engine, prints a finer line than does the laser-equipped Apple LaserWriter IINTX but has more curvature. The Hewlett-Packard LaserJet III does a better job in both respects, thanks to its Resolution Enhancement Technology. The Varityper, with its 600-dpi resolution, produces the best toner-based output. The Linotronic film, at 1,270 dpi, produces the best hairlines, superior to any toner-based image.

hints — special instructions for improving a font's appearance when it's printed on 300-dpi laser printers — whereas Type 3 fonts are unhinted. The Kyocera, NewGen, and Printware clones, for example, have figured out how to read Type 1 fonts but have not yet figured out how to use the hints (and Adobe isn't telling). But as the latter two clones are higher-resolution printers, it's arguable whether they need hints anyway.

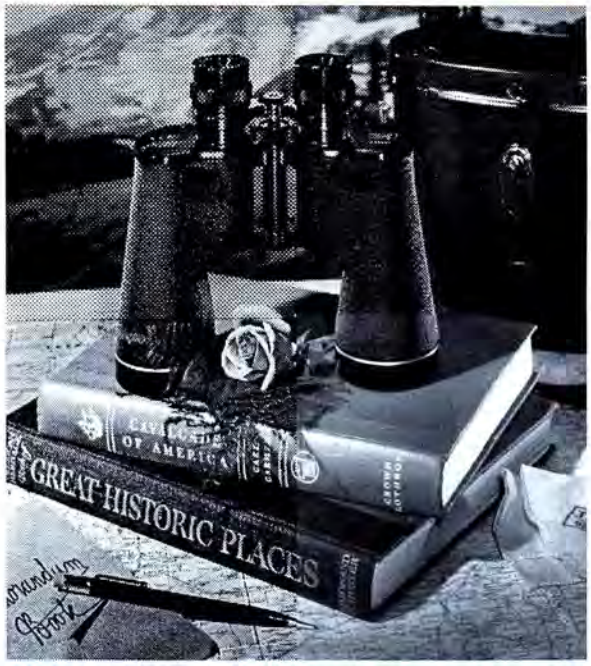
Some clones also have problems with complex PostScript graphics and large bit-mapped images, because of rasterizer incompatibilities or insufficient RAM. The LaserMAX 1000 Personal Typesetter and the MacProducts MagicPrint failed to print our sample Illustrator and PageMaker documents, but the companies are expected to fix their rasterizer problems by the time you read this. And the Printware 720 IQ failed the QuickDraw test — it was unable to print all the layers of our test document — probably because of insufficient RAM.

All problems aside, though, the fact that every Mac-compatible PostScript printer — whether it's a clone or Adobe-sanctioned — is plug-and-play should convince even the worst cynics about the virtues of buying one. Every printer we looked at was network-ready, complete with the necessary cables and connectors to hook up to your networked Macs (although the Varityper VT600P, a large and complex piece of equipment, is best installed by a professional trained to do the job). And a single Apple LaserWriter driver installed in those Macs can drive all PostScript printers — unlike in the DOS world, in which different printers and applications each have their own unique drivers. That's not to say that Apple's driver hasn't been improved. Fujitsu and NEC offer special INITs that you can add to Apple's driver for selecting between paper trays; Agfa's and Dataproducts' DAs do the same thing. Adobe itself is developing an improved PostScript printer driver that will better address printer-specific features such as stapling, multiple paper bins, and duplex printing.

But enough prelude. You should first define the type of printer you need — for personal, corporate, or desktop-publishing use. Then look

Figure 3: Gray Scale and Halftone

microLaser PS35 Varityper VT600P



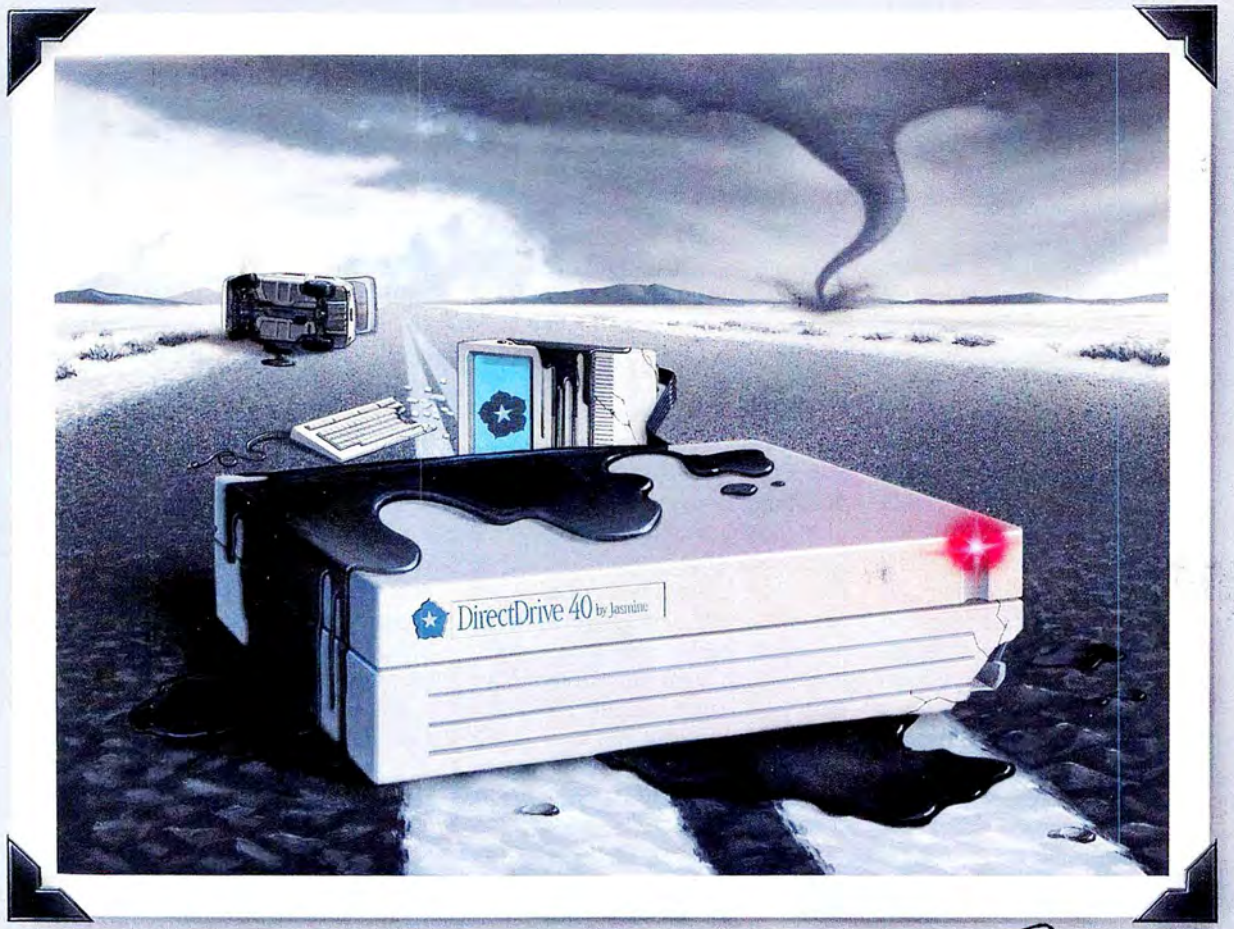
NewGen Linotronic

Figure 3: The 300-dpi microLaser PS35 has only 90,000 dots per square inch to work with, but the result is pretty good. The 600-dpi Varityper VT600P has 360,000 dots per square inch to use and does a proportionally better job. The 800-dpi-x-400-dpi NewGen does a slightly better job with fewer dots: only 320,000 per square inch. Either produces acceptable camera-ready output. The 1,270-dpi Linotronic film has more than 1.5 million dots per square inch to use and is suitable for high-quality magazine reproduction.

Figure 4: Text Resolution



Figure 4: In our tests for text-output quality, the 300-dpi NEC Silentwriter LC 890XL trailed the pack. The letters appear clumped and choked compared with those from the Dataproducts LZR 1260i, which show above-average results for 300 dpi. The Hewlett-Packard LaserJet III uses its Resolution Enhancement Technology to produce smoother 300-dpi text, but it doesn't compare with the Printware 720 IQ's 1,200-dpi-x-600-dpi enhanced output. This, in turn, pales next to the fine-grain results of Linotronic film.



You Can Count on Jasmine!

Dear Jasmine Technologies,

Occasionally we win one.

On 11/15/89, as I was driving home from work, a tornado formed just to the west of me. I had enough time to pull into a safe parking lot and duck down. The "safe parking lot" turned out to be right in the path of the tornado. I was knocked out as the 200 MPH winds struck, flying my car—and me—nearly 300 yards. I woke up in the hospital with a severe concussion and blood loss. As part of the $250 million storm damage, my car was totalled and my computer was lost.

After I was released from the Hospital, my wife and I went to the Police Station where some "valuables" had been rescued from the disaster scene. There was my Macintosh SE with its Jasmine drive. The hardware was in sad shape; the front SE surface was bashed in, there was a big piece missing from the Jasmine Drive, and both were coated with a mixture of motor oil, antifreeze and water. The insurance company agreed that it was a total loss. But, realizing that the damage was finite, I began cleaning and straightening out everything. I jokingly powered up—IT WORKED! The bashed-in Jasmine drive booted the straightened out SE giving me a happy Mac, displaying the partitioned icons and sat there waiting! The clock was even right! So far, the drive has yet to fail.

I'm writing this letter (on the Jasmine drive) of appreciation to all of you in hope that you will be as pleased as I am that your products survived the forces of a major tornado that was blowing manhole covers around like frisbees. I don't have the foggiest idea where the drive ended up, but judging from all the junk coating it, it must have been found under one of the piles of destroyed cars.

In summary: the car was totalled, I was almost totalled, but the Jasmine drive made it O.K. Congratulations on making some darn good stuff. I plan to take the scarred hardware to work and continue to use it there as a reminder of one of the positive aspects of that unfortunate experience.

Sincerely,

Eugene K. Lawson

Gene Lawson

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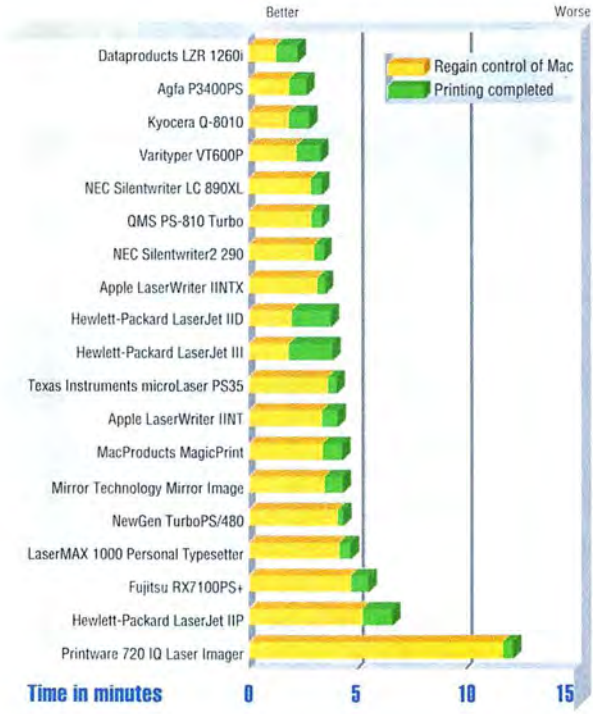
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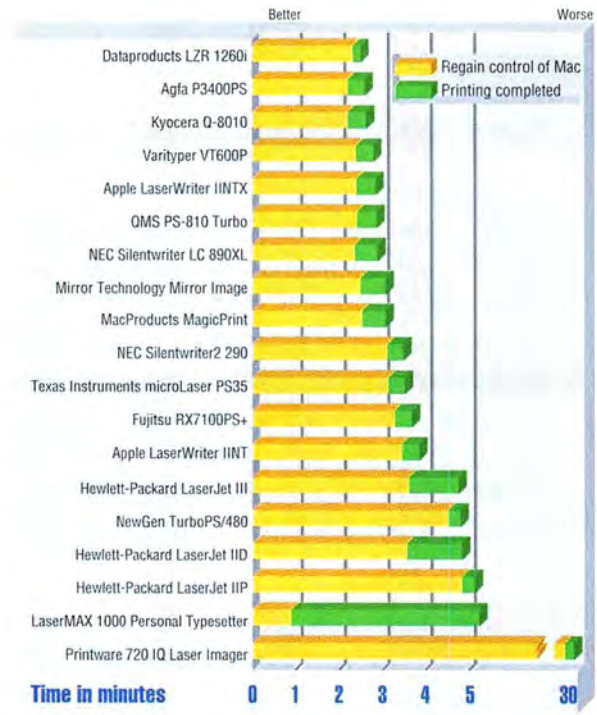
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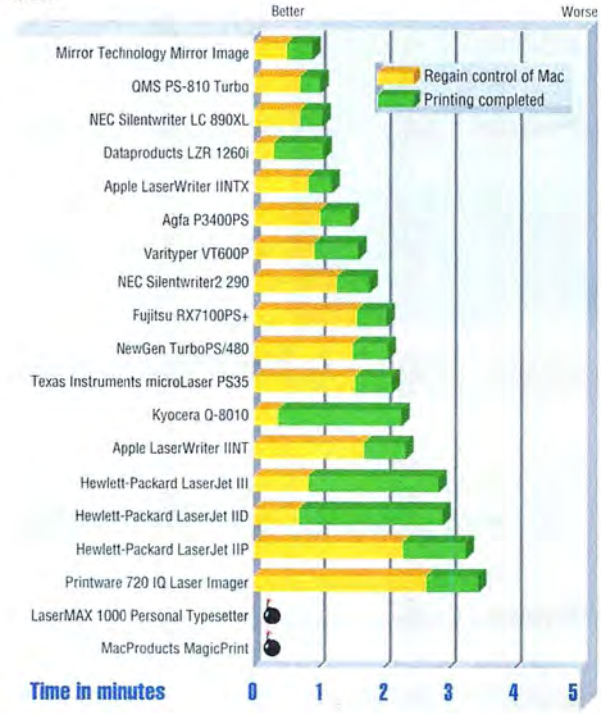
Figure 5: Printing Speed



Word

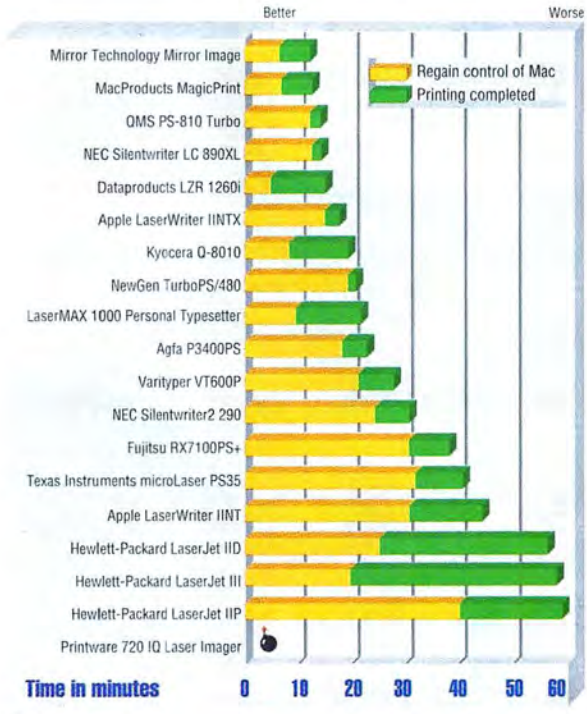


Excel

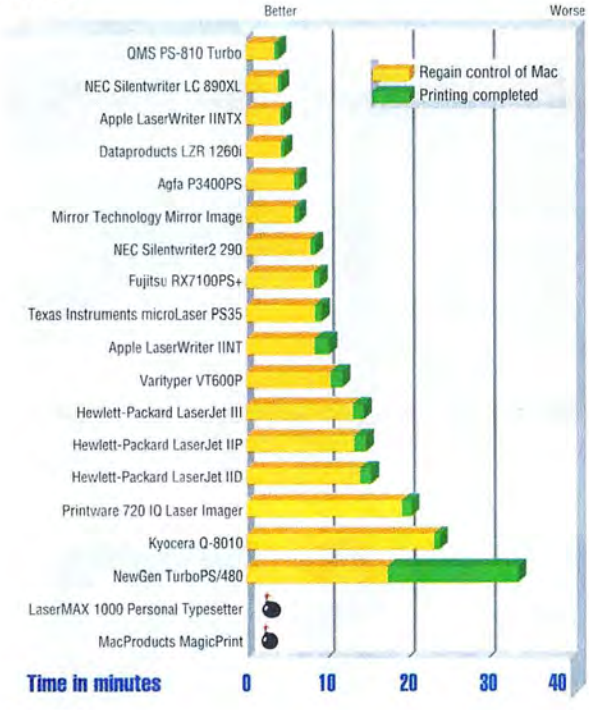


Illustrator

Figure 5: To create benchmarks for the speed of each printer, we used five types of test documents: Word, Excel, Illustrator, MacDraw, and PageMaker. The 25-page Word file is a relatively simple text file that demonstrates the differences in rated engine speeds. With the exception of the Printware 720 IQ, whose speed is skewed by its enhancement techniques, the printers fall into groups based on engine speed: 4 ppm, 6 ppm, and so on. The other tests tax the printer's processor, so the groupings reflect the type of chip the printer uses: the Motorola 68000 or 68020 or the Weitek RISC chip in the MagicPrint and Mirror Image. Some of the clones had compatibility problems and failed to print some of the documents.



MacDraw



PageMaker

Figure 6: Cost per Page

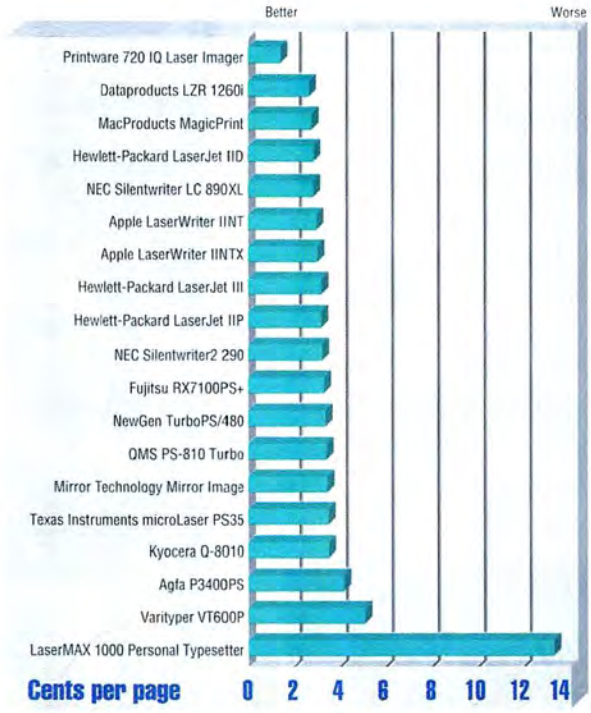
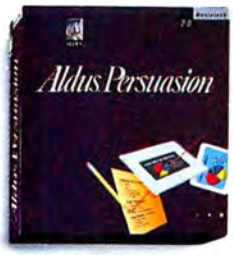


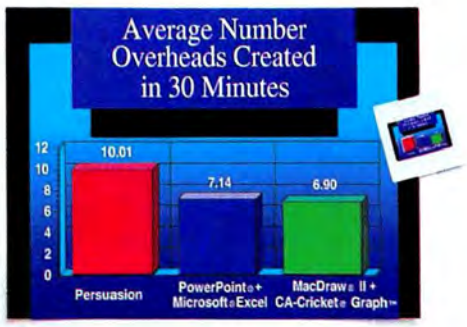
Figure 6: Printers cost money to run. Most printers come in at 3 cents per page in consumables cost — that's for toner, drum, and sometimes developer. The average Canon cartridge, toner, and drum, good for 4,000 copies, costs around $120. The LaserMAX is the most expensive to use, at close to 13 cents a page, because of its conservative page rating for its toner/drum cartridge, good for only 1,500 copies. The Printware is the least expensive, at a little more than a penny a page. The Printware's drum is rated at an impressive 100,000 pages, and toner is an affordable $39 for 5,000 pages.



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closely at the performance issues just explained and the results of our tests in three areas — image quality, speed, and ease of use. Only then are you going to have all the information you need to make the best decision about PostScript.

Quality Imaging

The key to superior image quality is high resolution: The higher the printer's resolution, the better the image. The printer-engine type also affects quality. In general, printers with the same engine but from different vendors produce similar-quality output. The PostScript interpreter — the mixture of software and hardware in each printer that processes the data from your Macintosh — seems to have relatively little effect on image quality: The document either prints or it doesn't.

One factor that does make a difference to image quality is a printer's ability to interpret hinted fonts. On 300-dpi printers, hinted fonts generally look better than unhinted ones. Clones that can't handle hinted fonts are at a disadvantage compared with those that can.

To rate image quality, we assembled a jury of printer experts and experienced users. We showed them each printer's version of a test page that we had designed to show strengths and weaknesses in printing type, lines, and gray scales. The jury awarded marks for each element on the page, and we totaled and averaged the results (see Figure 1).

The results were revealing — even controversial. The Varityper VT600P, at 600 dpi, consistently performed the best, even compared with PostScript clones such as the LaserMAX 1000 Personal Typesetter that have engines tweaked to give enhanced resolution (see the "How It Works: Enhancing Resolution" sidebar). But you pay for this quality. At $16,995, the Varityper costs nearly $9,000 more than the LaserMAX 1000 and $5,000 more than the Printware 720 IQ, two runners-up in image quality. Even though the LaserMAX 1000's stated resolution of 1,000 dpi helped it win in the line-art and PostScript-image categories, our jury found its text and gray-scale quality to be the worst of the high-resolution printers (see Figure 2).

The enhanced-resolution printers,

One-on-One: The Personal-Printer Market

A personal PostScript printer should be able to handle anything from simple business letters to proofs for a higher-quality imagesetter. Because a personal printer is for you and you alone, price is probably the primary selling point. And because you'll be working at home or in your already crowded office, you'll also want a printer that doesn't weigh as much or take up as much space as a refrigerator.

We used the $4,499 Apple LaserWriter IINT, Apple's standard PostScript printer, as the upper price/performance limit for the personal-printer category. Using the same Canon engine as the Apple LaserWriter IINTX, the IINT offers reasonable text performance, but it lags far behind the IINTX in graphics-printing speed, because of its less powerful processor. We think you'll decide that the $1,500 difference in price makes it worth putting up with the slow speed. If you change your mind later and decide to upgrade to a IINTX, you'll pay for your fickleness: The upgrade costs a whopping $3,699.

The IINT has been around long enough to set a standard, but a new crop of printers has more than met the challenge. The most impressive of these new affordable printers is the compact, 33.5-pound Texas Instruments microLaser PS35, with a list price of $2,999. Based on a new 6-ppm (page per minute) Sharp Ipia engine, the microLaser put up performance numbers that were consistently a little better than those of the LaserWriter IINT, even though the IINT uses an 8-ppm engine and both printers use the same type of processor. The faster times are probably because of the new ATM font rasterizer in the microLaser's PostScript ROM. (The font rasterizer is the part of PostScript code that converts the font outline into a bit map that the printer uses to produce a page.) When you turn on the microLaser, it produces a test page that provides useful information about the status of the toner cartridge and imaging drum — a nice feature for personal-printer users, who probably would not keep a large supply of either on hand.

MacProducts' MagicPrint and Mirror Technology's Mirror Image are identical, except for the version of the PostScript clone that we tested in each. Both employ an efficient Weitek RISC-chip processor running Weitek's HyperScript PostScript-clone PDL (page-description language) instead of Adobe-sanctioned PostScript. As with most PostScript-clone printers, neither printer is compatible with Adobe Type 1 fonts. The MagicPrint also proved incompatible with Adobe Illustrator and Aldus PageMaker. The Mirror Image — with its more recent version of the PostScript-clone firmware — gave us no trouble. MacProducts assured us that only the latest version (which resolves these incompatibilities) will ship with its printers by the time you read this.

The MagicPrint and Mirror Image were among the fastest performers in handling graphics files. The printers use a 6-ppm Casio LCS (liquid-crystal shutter) engine with image quality that ranked favorably in the jurying. If you don't need Type 1 compatibility, the speed of either of these printers may make them a better choice for you than the Texas Instruments microLaser PS35. If so, we suggest you buy the MagicPrint, which MacProducts sells for $2,500 bundled with Altsys' Metamorphosis, a program that converts Type 1 fonts into Type 3 fonts. The Mirror Image, which sells for $2,997, ships without any software.

NEC's entry in the personal market, the Silentwriter2 290, is based on a Canon 8-ppm engine — which, by the way, isn't appreciably more "silent" than any of the other engines we tested. Using the new ATM font rasterizer and coupling it with a processor running at a faster speed, the Silentwriter2 290 turned in faster times than either the Apple LaserWriter IINT or the Texas Instruments microLaser. At a price of $3,995, the Silentwriter2 290 is cheaper than the IINT, but it's not cheap enough — we still recommend the microLaser, at $1,000 less. Interestingly, NEC opted to go with Canon's laser engine for the Silentwriter2 290 rather than with its own LED engine used in its corporate-class Silentwriter LC 890XL (which our jurors consistently gave poor marks for image quality). The Silentwriter2 290 beat the Silentwriter LC 890XL in every juried category.

The Fujitsu RX7100PS+ is also worth a look, at its reduced price of $3,995, compared with its old price of $4,795. The Fujitsu is faster than the IINT but slower than the NEC Silentwriter2 290. It offers two paper trays along with nice bundled software, compared with the NEC's single paper tray. The Fujitsu ships with a special INIT that allows selectability between trays and a simple letter- and envelope-formatting program, QuickLetter. These features may make the Fujitsu RX7100PS+ more attractive than the NEC Silentwriter2 290,

with their higher dot density, had a distinct gray-scale advantage over the 300-dpi printers (see Figure 3). Of the four, the NewGen Turbo PS/480 looked best (with the Printware 720 IQ a close second), perhaps because of its special Hi-Resolution toner cartridge ($195), which NewGen claims is optimized for finer dots. All the high-resolution printers use special toner that is ground to a smaller size (9 microns) than normal toner (12 microns); such toner is available only from the manufacturer.

The fourteen 300-dpi printers performed on a par with each other in terms of image quality, with the exception of the NEC Silentwriter LC 890XL, which consistently received the lowest jury ratings. The Hewlett-Packard LaserJet III — with its Resolution Enhancement Technology, which uses variable dot size and placement to obtain finer lines and smoother curves (see the "How It Works: Enhancing Resolution" sidebar) — produced only slightly better text (see Figure 4).

Text quality also depends on the printer's accuracy in rendering fonts. Some of the clones had letterspacing problems. The NewGen TurboPS/480 produced characters that were spaced differently from those of the Adobe-sanctioned printers that use the same downloaded fonts. However, we could detect little difference between the clones' handling of Adobe Type 1 hinted fonts and their handling of equivalent Bitstream Type B hinted fonts. Subtle differences, such as character shape and spacing, between some supposedly equivalent font types do exist, so if you plan to use a service bureau for final output, make sure that it either uses the same fonts or is willing to use fonts that you supply. Otherwise you may find differences in line breaks and pagination between your on-screen expectations and your printed documents.

The Nimble Printer

Rating printer speed is a complex business (see Figure 5). Engine speed is not in itself a reliable indicator of overall printer speed, because a fast engine teamed with a slow rasterizer usually results in a slow printer. Some printers use RISC (reduced instruction set computer) chips in their interpreters. These are generally faster

but the microLaser remains the one to beat.

Last, though certainly not least, of the personal printers are the two from Hewlett-Packard: the LaserJet IIP and LaserJet III. Although we eagerly anticipated testing all three LaserJets (including the LaserJet IID, which we discuss in the "Many-on-One: The Corporate Choice" sidebar), their performances were disappointing. The LaserJet IIP has one great feature: its low price. The version we tested (with LocalTalk, Adobe PostScript, and an optional memory upgrade) lists at $3,205, but you should find this printer at street prices closer to $2,000. Also, inexpensive third-party PostScript-clone cartridges and interface options from companies such as Pacific Data Page, PCPI, and Computer Peripherals should push this price even lower. These items will be available for all the Hewlett-Packard LaserJets. The LaserJet III we tested lists for $4,105, a price that includes Hewlett-Packard's RET (Resolution Enhancement Technology) (see the "How It Works: Enhancing Resolution" sidebar). For less money than the LaserWriter IINT costs, you get text resolution that rivals that of higher-resolution printers — almost. All three LaserJets add PostScript via a plug-in cartridge that also contains the new ATM font rasterizer and 35 outline fonts. The processor and RAM are in the printer. We tested the IIP and III with an additional 2 megabytes of RAM each.

The LaserJet IIP, with its 4-ppm Canon LBP-LX engine, was the slowest of all the printers — with the exception of the Printware 720 IQ, whose improved resolution of 1,200 horizontal dpi x 600 vertical dpi excuses its slow performance with text. In other, more graphics-intensive, tests, all the LaserJets were consistently among the slowest of the printers. This slowness is less painful because the printers buffer the page and then RIP it, thus returning the cursor quickly to the Mac.

Overall, however, our disappointment in the Hewlett-Packard LaserJets was counterbalanced by our pleasant surprise at the elegant design, decent performance, and amazingly low list price of the Texas Instruments microLaser. At a list price of $2,999, this truly "micro" PostScript printer is our winner for today — but watch for even better price/performance leaders in the near future (see "The Next Wave of Personal PostScript Printers," also in this issue).



The personal best (foreground): microLaser PS35; the runners-up (background): Mirror Image (left) and MagicPrint



The contenders (clockwise from upper left): Hewlett-Packard LaserJet III, NEC Silentwriter2 290, Fujitsu RX7100PS+, Apple LaserWriter IINT, and Hewlett-Packard LaserJet IIP

Many-on-One: The Corporate Choice

A corporate laser printer is suited for a high-volume, medium-to-large network environment. The ideal corporate PostScript printer should have a fast engine for text-intensive output, should have a heavy-duty life cycle, and should offer extra paper bins with large capacity. (If your corporation has moved into the DTP arena with your own in-house publications, you may also want to look at the "All-in-One: The Desktop Publisher" sidebar.)

The Dataproducts LZR 1260i rose above the others as the ideal business printer. It uses a 12-ppm Toshiba engine coupled with a Motorola 68020 and was the fastest printer in text as well as spreadsheet tests. In fact, the LRZ 1260i consistently finished near the top in *all* the performance benchmarks. It comes standard with a 250-sheet tray and — like a true business printer — has a myriad of paper-feed options, such as a 100-envelope feeder ($1,095) and a dual-input cassette ($895) with two paper trays, each holding 250 sheets. Although pricey, these options aren't available for any other printer. It also has a SCSI port for an optional hard-disk drive for font storage and caching.

Following right behind in pure performance are the Agfa P3400PS and the Kyocera Q-8010 — two vastly dissimilar machines. The Agfa is a 400-dpi workhorse that can crank out a lot of pages with its standard two trays, which can hold 250 sheets each. It includes an internal 20-megabyte hard-disk drive that contains 60 of its 73 fonts; the remaining 13 are in ROM. A large unit weighing 102 pounds, the Agfa uses a 12-ppm Minolta engine that gives good text resolution, although it did not fare well in the image-quality jurying. Because its graphics rendering is not among the best, it's debatable whether the extra resolution is worth the high price of $9,995.



The corporate winner (foreground): the Dataproducts LZR1260i The single-bin contenders (background, left to right): Hewlett-Packard LaserJet III, Kyocera Q-8010, Apple LaserWriter IINTX, and QMS PS-810 Turbo



The dual-bin contenders (left to right): Hewlett-Packard LaserJet IID, Agfa P3400PS, Fujitsu RX7100PS+, and NEC Silentwriter LC 890XL

The Kyocera Q-8010 ($6,995) uses its own 10-ppm engine, a proprietary PostScript-clone PDL, and 5 megabytes of RAM to get speeds near those of the 12-ppm Agfa and Dataproducts printers. The Q-8010 is, however, limited by a single paper tray with no options for envelopes or extra bins.

The Kyocera is the only printer we reviewed that can receive data through three active ports — serial, parallel, and LocalTalk — simultaneously and that lets you switch among different printer emulations. The printer processes data coming via the first port while buffering and sending wait signals to the other ports. The Kyocera also accepts either PostScript or PCL (Hewlett-Packard LaserJet PDL) languages. These are nice features for mixed PC/Mac networks. PCs use both serial and parallel interfaces, and they use mostly PCL. To change the emulations on other printers, you need to flip switches manually on the printer's front panel. The Kyocera was the first to offer automatic configuration, but we expect more printers will do so as more networks become mixed.

Both the Apple LaserWriter IINT and the IINTX can be considered qualified candidates to be corporate PostScript printers. In our tests, the IINT, with its 8-ppm Canon engine and Motorola 68000 processor, set the lower boundary for acceptable speed for printing text, but it was among the slowest spreadsheet printers, so we judged it too slow for network use. The Apple LaserWriter IINTX ($5,995) fared better and, with the QMS PS-810 Turbo ($5,495), came right behind the Dataproducts LZR 1260i in performance, quality, and price.

The LaserWriter IINTX and the PS-810 Turbo use the same Canon engine and a Motorola 68020 (the QMS runs at a faster clock speed), and both are consistently among the fastest printers. Unfortunately, although the IINTX has a SCSI port for a hard-disk drive, it lacks paper-feed options such as dual bins. An alternative solution, such as BDT's paper feeders, provide the IINTX with three, four, or even five extra bins, all accessible through a special Chooser-level driver. They're not cheap, though, costing $1,545, $1,945, and $3,490, respectively. QMS also offers a dual-bin version of the 810, the PS-820 Turbo, at $6,495.

The NEC Silentwriter LC 890XL ($5,995) is among the fastest of the printers we tested, but it consistently scored the lowest in image quality. It does offer two paper bins, which each hold 250 sheets.

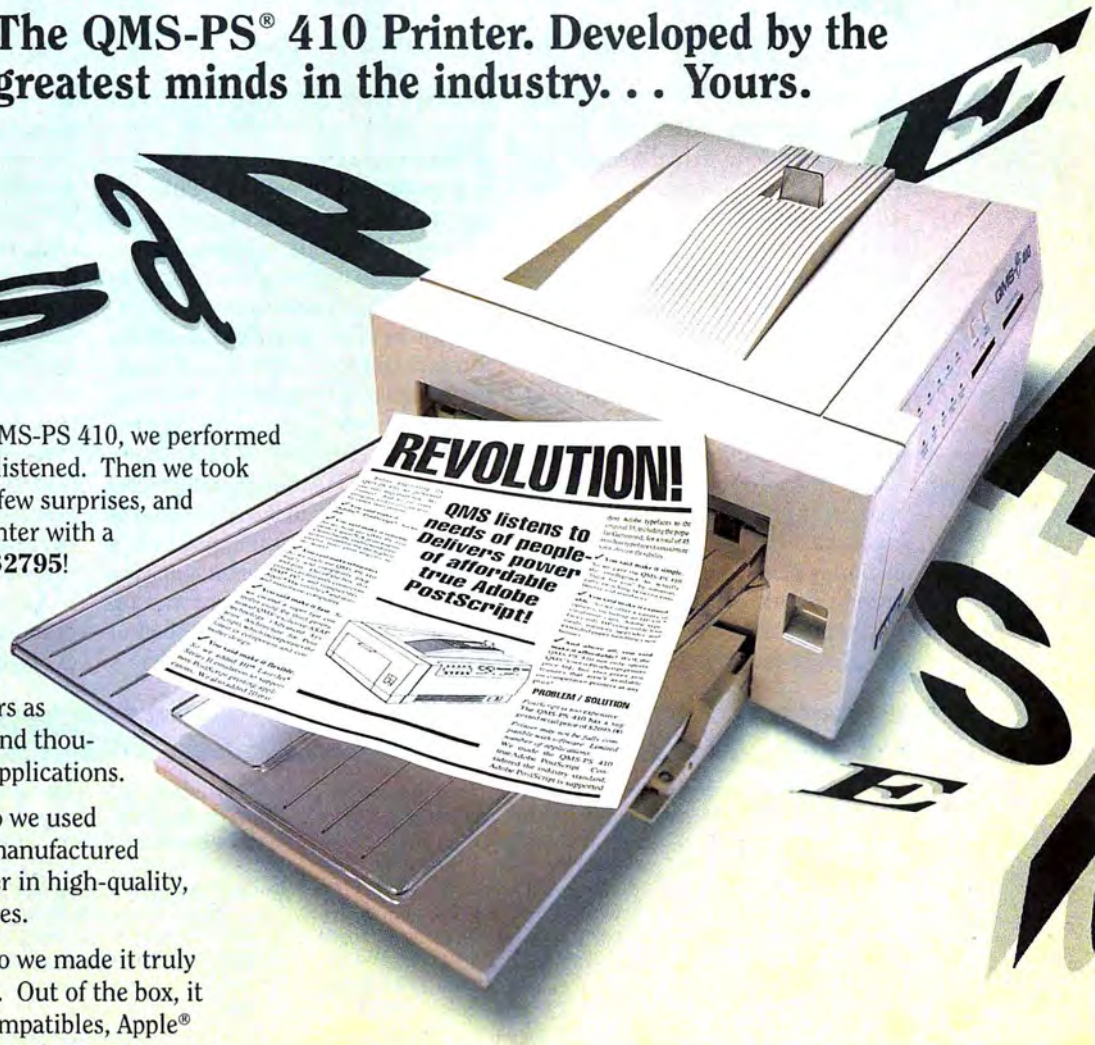
The Fujitsu RX7100PS+ ($3,995) also offers two bins, each holding 150 sheets. It comes bundled with a Select-A-Bin INIT, for choosing the correct paper bin, and QuickLetter, a simple and convenient letter- and envelope-writing program — a nice combination for business users. However, the Fujitsu RX7100PS+'s performance is only slightly better than the LaserWriter IINT's — too slow for heavy network use.

The Hewlett-Packard printers, although disappointing in performance (see the "One-on-One" sidebar), offer bottom-line business buyers too much for them to be ignored. The LaserJet IID is the ultimate paper handler, offering everything from two paper bins, each with a 200-sheet capacity, to *duplex printing* (automatic printing on both sides), a feature unique among all the printers we tested. The IID could use a more powerful processor than the Motorola 68000, but at a price of $5,360 (which includes the necessary upgrade to 2 megabytes of RAM, PostScript, and LocalTalk), the IID is a contender in the corporate market. The LaserJet III could also use more processor horsepower, but it is less of a contender.

Although the Dataproducts LZR 1260i is our first choice for corporate buyers because of its speed, corporations seeking high-quality output will put up with a slower printer to get it. Take a look at the "All-in-One: The Desktop Publisher" sidebar for an examination of the field of better-resolution printers.

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than printers that have interpreters based on the Motorola 68000 or 68020 (the same chips used in the Mac Plus, SE, and II — see "Chasing the IIfx: Accelerators," August '90, page 84). At testing time, however, there were no RISC interpreters using true Adobe PostScript, so RISC-based printers, as with other clones, have some font incompatibilities.

More RAM in a printer can speed up printing of complex documents or documents containing downloadable fonts. Some printers, such as the Kyocera Q-8010, can divide memory so that half of it is buffering an incoming page while the other half is processing the existing page.

The presence of a hard-disk drive can also speed things up. Having a font on a hard-disk drive means that a font not resident in the printer's ROM doesn't have to be downloaded over an AppleTalk network (throughput via a SCSI cable is always faster than via LocalTalk cabling). Using disk-resident fonts is almost as fast as using ROM-resident ones.

Printers also use hard-disk drives for a performance-enhancing technique called *font caching*. Because PostScript fonts are stored as mathematical descriptions of each font's outline, the PostScript interpreter scales the outline to the required size and then builds a bit-mapped image of the font in RAM. The bit maps are held in RAM as long as there's room, but they often have to be flushed to free up RAM for other tasks. Here's where font caching helps: If the same point size is required once more, the interpreter has to perform the scaling and rasterizing operations over again. With a hard-disk drive available, however, the bit maps can be written to the disk drive — cached — as they're flushed from the printer's RAM and then recalled from the disk drive as needed. This eliminates the time penalty associated with reimaging the font.

Keep in mind that a printer's speed is affected by the kind of documents you typically print. For example, in our tests, the HP LaserJet IID and III finished in the middle of the pack when printing plain text, but they lost ground when printing just about every other kind of document. The

All-in-One: The Desktop Publisher

Desktop publishing requires a printer that's an all-around performer, with enough RAM for complex pages, good image quality for graphics as well as text, and reasonable speed at all tasks. A SCSI port for a hard-disk drive is almost a necessity, since you'll want to store fonts. Because output from imagesetters (ultrahigh-resolution equipment used in service bureaus) is often the final form of DTP documents and because the majority of service bureaus use Adobe Type 1 fonts, compatibility here is important. Some clones are compatible with Type 1 fonts, although they aren't able to print the hints of such fonts, resulting in poorer quality for small point sizes.

Because you pay significantly more for higher-resolution printers, which put more dots on the page, we compared printers of like resolution. Keep in mind that these printers are really not substitutes for professional imagesetters, regardless of their claims. A toner-based printer is simply not in the same category as a photographic-film-based typesetter such as a Linotronic, even when it has similar resolutions.

In our tests, the clear winner in the 300-dpi realm was the Dataproducts LZR 1260i. In overall speed, it was rivaled only by the Apple LaserWriter IINTX and the QMS PS-810 Turbo, but in straight text output, its 12-ppm engine gave it the edge. Its image quality was consistently above average in its class. A hard-disk drive is available as an option for greater font flexibility. Costing $5,995, it boasts a heavy-duty Toshiba engine with a rated life of 600,000 pages and a monthly duty cycle of 25,000 pages — great for busy desktop publishers. For PC/Mac mixed-platform shops, it has a parallel interface in addition to serial and LocalTalk ports. The toner, developer, and drum need to be replaced independently of each other, but the procedure is straightforward.

The QMS PS-810 Turbo and the Apple LaserWriter IINTX were close, but the PS-810 edged out the IINTX for second place because it's cheaper and faster. The PS-810 was the fastest Adobe PostScript printer in the graphics tests. It has a parallel interface, whereas the Apple printer doesn't. These printers both use the same 8-ppm engine from Canon, and both have a SCSI port for a hard-disk drive. The IINTX has RAM expansion to 12 megabytes; the QMS has RAM expansion to 3 megabytes. If you can live with less RAM (and you sometimes should, lest your service bureau choke on the size of your images), the fast QMS is the better buy.

The remaining two 300-dpi contenders are the Texas Instruments microLaser PS35 and the NEC Silentwriter2 290. The Texas Instruments microLaser offers such an attractive price/performance bargain that even with its slow speed, it warrants some discussion in this category. (You could afford two microLasers, at a list price of $2,999 each, for one LaserWriter IINTX.) The microLaser also offers a parallel interface and is expandable to 4.5 megabytes of RAM. It has outstanding on-board diagnostics, and the consumables are easy to replace. At a list price of $3,995, the NEC Silentwriter2 290 is also worth noting, because it was the fastest of the "personal" laser printers in our tests. But the QMS PS-810 Turbo was still two to three times as fast for graphics.

We also looked at two higher-resolution PostScript printers, the 400-dpi Agfa P3400PS and the 600-dpi Varityper VT600P. The P3400PS was among the fastest printers we tested, but it got a low score for image quality, because it consistently printed too light (even after we replaced the drum with a new one) — and it has no density control to compensate for this flaw. We felt that the difference between 300 dpi and 400 dpi didn't justify its high price of $9,995.

With a list price of $16,995, the Varityper VT600P, a large industrial-strength beast, was the most expensive printer we tested. It received the highest overall score for image quality, beating printers that claimed resolutions of up to 1,000 dpi. For straight text output, it was one of the fastest. In the page-layout test, it was somewhat slower, however, falling behind the LaserWriter IINT and IINTX. Bear in mind that the 600-dpi VT600P must process four times as much information as a 300-dpi printer does, because its area resolution is four times that of a 300-dpi printer. It's the least expensive printer for preparing camera-ready copy for newsprint-quality jobs.

Finally, we looked at three *enhanced-resolution* PostScript-clone printers, so called because they take existing engines that would normally print at 400 and 600 dpi and tweak them to yield higher resolutions (see the "How It Works: Enhancing Resolution" sidebar). The LaserMAX 1000 Personal Typesetter claims an "effective resolution" of 1,000 dpi both horizontally and vertically. The NewGen TurboPS/480 claims 800 horizontal dpi x 400 vertical dpi, and the

message here is that you should examine speed results with an eye to the kind of user you are — personal, corporate, or desktop publisher — and the kind of documents you usually print. You should weigh speed against image quality and price. Corporate users who output primarily text and spreadsheets might be happy with the Dataproducts LZR 1260i, consistently one of the fastest printers, whereas DTP experts might be satisfied with the Printware 720 IQ, runner-up to the Varityper VT600P in image quality (and much cheaper), although it was consistently the slowest printer in the pack.

We ran a battery of speed tests to emulate different ways in which printers are used. Using the printer's built-in fonts, we printed a 25-page Word 4.0 document. The results of this test largely reflected engine speed; the processor has minimal effect because it's rendering fonts only in 8-, 10-, and 12-point sizes.

A 10-page Excel spreadsheet, also using built-in fonts and with the grid lines visible, tested the processor as well as the engine, because the processor is called on to rasterize grid lines and cell formats as well as fonts.

We used a 1-page Adobe Illustrator graphic to test each printer's PostScript interpreter and, in the case of the clones, compatibility. The Dataproducts LZR 1260i, QMS PS-810 Turbo, and Apple LaserWriter IINTX were fast; the Hewlett-Packard LaserJets and the Printware 720 IQ were slow. The MacProducts MagicPrint (with firmware 3.00) and the LaserMAX 1000 failed to print the page at all. MacProducts and LaserMAX were working out their compatibility problems as we went to press.

A 1-page MacDraw file containing many layers of circles filled with different patterns proved to be the acid test for a printer's processor. It took the Apple LaserWriter IINT, an average-speed printer with a Motorola 68000 processor, some 40 minutes to print the page. The Hewlett-Packard LaserJets were even slower. The MacProducts MagicPrint and Mirror Technology's Mirror Image blew everyone away by finishing in 12 minutes. Their RISC processors

Printware 720 Professional Laser Imager claims 1,200 horizontal dpi x 600 vertical dpi. Each printer's output is clearly superior to that of a 300-dpi printer, but none of them received as high a score as the 600-dpi Varityper. You should therefore take claims of enhanced resolution with a grain of salt. In fact, the NewGen, with the lowest dpi claim, received the highest overall score for image quality.

The LaserMAX 1000 has one glaring drawback — it requires a dedicated Mac II to print, because its RIP is contained in a NuBus card. It also failed our page-layout and PostScript-art tests because of compatibility problems. The NewGen had less severe problems than the LaserMAX, but it still proved incompatible with the PageMaker and Illustrator documents. The Printware 720 IQ had the fewest compatibility problems of the three, but it was very slow, particularly in the text and spreadsheet tests — in some cases, our front-runners were four to ten times faster — and it failed our QuickDraw test.

The NewGen Turbo PS/480 had trouble printing the TIFF file in our PageMaker test but did print the same image as an EPS file. It had the fastest text performance of the three but had some strange letter-spacing with particular fonts, indicating possible compatibility problems. On image quality, the NewGen Turbo PS/480 had the highest overall score, but the Printware 720 IQ beat it in quality of text output, coming in second only to the top-rated Varityper VT600P. The Printware 720 IQ and the LaserMAX 1000 had almost identical overall scores: The LaserMAX1000 had the best graphics performance, but this was offset by its poor text quality — it scored lower than some 300-dpi printers.

Some printers — the Apple LaserWriter IINT, all three Hewlett-Packard printers, the Fujitsu RX7100PS+, and the Kyocera Q-8010 — were just too slow to find a home in a DTP shop. The Mirror Technology Mirror Image and the MacProducts MagicPrint printers were excluded, because they cannot currently handle Type 1 fonts. The MagicPrint also bombed during our page-layout test. Finally, we eliminated the NEC Silentwriter LC 890XL on the basis of its poor image quality.

All in all, we found that the best printers in this category give excellent image quality, but no toner-based printer can give you the magazine-quality images and text of a true imagesetter.



The winners (right): Dataproducts LZR 1260i (lower), Varityper VT600P (upper); the runners-up (left): QMS PS-810 Turbo (lower) and Printware 720 IQ Professional Laser Imager (upper)



Contenders (clockwise from upper left): LaserMAX 1000 Personal Typesetter, Texas Instruments microLaser PS35, LaserWriter IINTX, NEC Silentwriter2 290, and NewGen TurboPS/480

are much faster than the average Motorola versions. The QMS PS-810 Turbo, running a Motorola 68020 at 20 megahertz, followed close behind at just under 14 minutes.

A 7-page PageMaker document tested the overall processor speed and *printer* throughput: the speed with which the printer accepts information through the AppleTalk connection. The document contained a 100-dpi scanned (TIFF) image, text (resident fonts), EPS art and patterns, and hairlines. The 686K TIFF file, in particular, taxes printer throughput. (For an explanation of these and other equally obscure file formats, see the "MacUser Guide to Graphics Formats" poster in the September '90 issue.)

Finally, to test font-download capability, we printed a single PageMaker page containing 17 downloadable fonts, using either Adobe Type 1 or Bitstream Type B fonts, depending on which worked best on each printer. This tests the speed of the processor and the efficiency of the printer's PostScript page-description language (or variant) in switching fonts in and out of RAM.

Easy Does It

Finally, no matter how crisp your printer's images are or how fast it can churn them out, it must still be easy to live with, especially if you're a personal user responsible for its maintenance. When we judged printers for their ease of use, we considered three areas: ease of setup, day-to-day use, and maintenance requirements. If a printer had a complex setup, we noted whether installation was included in the purchase price. Although we didn't assign numbers in our ease-of-use category, the numbers factored into our overall judgments of a printer and are reflected in the mouse ratings.

In day-to-day use, we considered features such as noise level, variable density settings for tweaking the resolution of your output, warning lights for paper jams and toner depletion, and extra features such as envelope feeders and multiple paper bins. Font and application compatibility were important factors in our clone ratings. We also considered the day-to-day cost of using the printers (see Figure 6).

Our maintenance judgments cover replacement of consumables such as toner and developer and replacement of the drum. The sidebars mention where a printer is exceptionally good or bad in this area. Note that Table 1 gives the monthly duty cycle of a printer — important for busy corporate users — the number of copies you can expect from a cartridge, and the cost for replacement. (As an aside, Canon provides users with a socially responsible way to recycle toner cartridges, called the Clean Earth Campaign. Canon includes a collection kit with each toner cartridge. You merely put the used cartridge into the prepaid UPS envelope and, at Canon's expense, ship it to the factory, where the cartridge will be recycled. A nice touch — but remember that some companies *buy* your used toner cartridges.)

As you decide which printer to purchase, keep in mind that a new generation of PostScript printers (and Apple's TrueImage equivalent) is right around the corner. If you think that the low-cost Texas Instruments microLaser PS35 is a hot printer for the personal user or that the speed of the Dataproducts LZR 1260i makes it the one for the corporate buyer or that the high-quality, high-priced Varityper VT600P produces the ultimate in superb DTP output, you're in for a shock with the upcoming Qume and QMS printers (see "The Next Wave of Personal PostScript Printers," following). In the world of PostScript printers, quality and speed are improving daily and prices are dropping overnight.

Bruce Fraser believes that the keys to a successful relationship with your PostScript printer are Type 1-font compatibility and easy access to the espresso machine. Paul Yi is a former project leader in MacUser Labs; this is his first report in his new role as an associate editor.

The Bottom Line

Three types of users can benefit from the crisp text and precise graphics produced by a PostScript printer: the personal user, the corporate buyer, and the desktop publisher. Each requires different features from a printer, so we recommend a different printer for each.

The clear winner in the personal-printer category is the **Texas Instruments microLaser PS35** ($2,999), the first Adobe PostScript printer with a list price of less than $3,000. Its design is elegant, and it offers the smallest footprint of any laser printer. It gives you more bang for the buck and outperforms all its competitors in most performance tests.

The **Dataproducts LZR 1260i** ($5,995) wins in both the corporate-buyer and the desktop-publishing categories. In our previous look at PostScript printers (see "Fit to Print," September '89, page 178), it tied with the **Apple LaserWriter IINTX** in performance but lost to it in bulkiness and price. This year's model is more compact, sports a SCSI port for attaching a hard-disk drive, and still offers more paper options than any other printer. With a 12-ppm engine and a Motorola 60820 processor, it was the fastest printer we tested for text and spreadsheets. The Dataproducts LZR 1260i is our favorite among favorites.

A close second favorite in the desktop-publishing category is the **QMS PS-810 Turbo** ($5,495). It produced the fastest graphics times, with its Motorola 68020 processor running at 20 megahertz.

For those desktop publishers who need a high-resolution printer, the winner is the **Varityper VT600P** ($16,995). Although it's pricey, it's the only viable solution for camera-ready PostScript output when less-than-magazine quality is acceptable. Our jurors ranked it the best in image quality, although it faced stiff competition from some high-resolution clones.

Actual screen shown using ColorStudio® by Letraset.®

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Table 1: Features of PostScript Printers

	Agfa P3400PS ★★½	Apple LaserWriter IINT ★★★	Apple LaserWriter IINTX ★★★★	Dataproducts LZR 1260i ★★★★½
List price	$9,995	$4,499	$5,995	$5,995
Comments	Fast. 400 dpi. Poor image quality. Overpriced.	The standard. Beginning to show its age in price/performance.	One of the best for price/performance. Lacks paper-feed options.	Fast. Flexible. Feature-laden. Competitive price.
Specifications				
Printer type	PostScript	PostScript	PostScript	PostScript
Engine, type	Minolta SP 140, laser	Canon LBP-SX, laser	Canon LBP-SX, laser	Toshiba A-739, laser
Engine life (pages)	600,000	300,000	300,000	600,000
Monthly duty cycle (pages)	10,000	NA	NA	25,000
Resolution, with enhancements	400 dpi	300 dpi	300 dpi	300 dpi
Microprocessor, clock speed	Motorola 68020, 16.7 MHz	Motorola 68000, 12 MHz	Motorola 68020, 16.7 MHz	Motorola 68020, 16.7 MHz
Pages per minute	12 ppm	8 ppm	8 ppm	12 ppm
RAM (standard, max.; upgrades)	4 MB	2 MB	2 MB, 12 MB; $299/MB, $999/4MB	4 MB
Hard-disk drive (standard, opt.)	20 MB, 100 MB	none	optional, prices vary	optional
Interfaces	parallel, serial, LocalTalk	serial, LocalTalk	serial, SCSI, LocalTalk	parallel, serial, SCSI, LocalTalk
Printer emulations	HP LaserJet II, Diablo 630	Diablo 630	HP LaserJet+, Diablo 630	HP LaserJet+
Software				
Number of fonts in ROM, type	13, Adobe (hinted)	35, Adobe (hinted)	35, Adobe (hinted)	35, Adobe (hinted)
Fonts supported	Type 1, 3	Type 1, 3	Type 1, 3	Type 1, 3
Bundled software	tray-selector DA	Apple printer utilities	Apple printer utilities	tray-selector DA
Paper handling				
Paper output (image up, down)	up, down	up, down	up, down	up, down
Paper stock min./max. (pounds)	16/24 lb	16/36 lb	16/36 lb	16/21 lb
No. of trays, page capacity (each)	2, 250	1, 200	1, 200	1, 250
Paper sizes	letter, legal, A4, A5, B5	letter, A4, B5, legal	letter, A4, B5, legal	letter, A4, A5, B5, legal, statement
Other features/options	faceup exit tray and jogger; backup paper tray	legal tray, $89; upgrade to IINTX, $3,699	legal tray, $89	legal tray, $95; dual-input cassette, $895; LZR 2665 26-ppm, 11 x 17, $18,700
Envelope tray (capacity, option)	none	15, optional, $89	15, optional, $89	100, optional, $1,095
Replacement supplies				
OPC (drum)/copies	$660/30,000	$119/4,000	$119/4,000	$326/25,000
Toner/copies	$50 (3 pack)/3,000 $60/30,000 (developer)	NA	NA	$31/5,000 $238/40,000 (developer), $108/80,000 (fuser)
Other				
Dimensions (W x D x H, in.)*	21 x 21 x 21	20 [26*] x 19 x 9	20 [26*] x 19 x 9	19 x 20 x 18
Weight	102 lb	45 lb	45 lb	107 lb
Warranty	90 days	1 year	1 year	1 year, 90 days on-site
Manufacturer	Agfa Compugraphic 200 Ballardvale Wilmington, MA 01887 (508) 658-5600	Apple Computer, Inc. 20525 Mariani Ave. Cupertino, CA 95014 (408) 996-1010	Apple Computer, Inc. 20525 Mariani Ave. Cupertino, CA 95014 (408) 996-1010	Dataproducts Corp. 6200 Canoga Ave. Woodland Hills, CA 91367-2499 (818) 887-8000

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Table 1: Features of PostScript Printers, continued

	Fujitsu RX7100PS+ ↕↕↕	Hewlett-Packard LaserJet IID ↕↕↕	Hewlett-Packard LaserJet IIP ↕↕	Hewlett-Packard LaserJet III ↕↕½
List price	$3,995	$3,595; for test, $5,360†	$1,495; for test, $3,205†	$2,395; for test, $4,105†
Comments	Quicker than a IINT. Two paper bins. Nice bundled software.	Business workhorse. Two bins. Duplex printing but too slow.	Least expensive. Too slow for Mac PostScript printing.	RET improves text. For Mac, PS output too slow.
Specifications				
Printer type	PostScript	PostScript option, $695	PostScript option, $695	PostScript option $695
Engine, type	Fujitsu, LED	Canon SX, laser	Canon LX, laser	Canon SX, laser
Engine life (pages)	180,000	300,000	150,000	300,000
Monthly duty cycle (pages)	3,000	16,000	6,000	16,000
Resolution, with enhancements	300 dpi	300 dpi	300 dpi	300 dpi
Microprocessor, clock speed	Motorola 68000, 12.5 MHz	Motorola 68000, 10 MHz	Motorola 68000, 10 MHz	Motorola 68000, 10 MHz
Pages per minute	5 ppm	8 ppm	4 ppm	8 ppm
RAM (standard, max.; upgrades)	4 MB	640K; 2 MB§, $795; 4 MB◊, $1,495	512K; 1 MB§, $495; 2 MB, $740	1 MB§; 1 MB, $495; 2 MB, $740
Hard-disk drive (standard, opt.)	none	none	none	none
Interfaces	parallel, serial, LocalTalk	parallel, serial; LocalTalk, $275	parallel, serial; LocalTalk, $275	parallel, serial; LocalTalk, $275
Printer emulations	HP LaserJet II	HP LaserJet II	HP LaserJet II	HP LaserJet II, HP LaserJet III
Software				
Number of fonts in ROM, type	35, Adobe (hinted)	14, Adobe (hinted)	14, Adobe (hinted)	14, Adobe (hinted)
Fonts supported	Type 1, 3	Type 1, 3	Type 1, 3	Type 1, 3
Bundled software	QuickLetter, Select-A-Bin	special printer driver	special printer driver	special printer driver
Paper handling				
Paper output (image up, down)	down	up, down	up, down	up, down
Paper stock min./max.(pounds)	17/28 lb	16/35 lb	16/28 lb	16/36 lb
No. of trays, page capacity (each)	2, 150	2, 200	1, 50	1, 200
Paper sizes	letter, legal, A4, B5	letter, legal, A4, executive	letter, legal, A4, executive	letter, legal, A4, executive
Other features/options	none	none	250-sheet lower tray, $195	5 tray options, $69 – $89
Envelope tray (capacity, option)	15	50, optional, $350	15	15
Replacement supplies				
OPC (drum)/copies	$185/6,000	$125/4,000	$95/3,500	$125/4,000
Toner/copies	$15/30,000 or 1 year	NA	NA	NA
Other				
Dimensions (W x D x H, in.)*	16 x 16 [27*] x 7 [18*]	12.3 x 18 x 35	8 x 13 x 25	18 x 19 x 8.5
Weight	44 lb	74 lb	22 lb	50 lb
Warranty	1 year	1 year, specials available	1 year, specials available	1 year, specials available
Manufacturer	Fujitsu America, Inc. 3055 Orchard Drive San Jose, CA 95134 (800) 626-4686 (408) 432-1300	Hewlett-Packard 19310 Pruneridge Ave. Cupertino, CA 95014 (800) 752-0900 (415) 857-1501	Hewlett-Packard 19310 Pruneridge Ave. Cupertino, CA 95014 (800) 752-0900 (415) 857-1501	Hewlett-Packard 19310 Pruneridge Ave. Cupertino, CA 95014 (800) 752-0900 (415) 857-1501

*With tray.

†Tested with optional 2 megabytes of RAM, PostScript, and LocalTalk.

§Minimum RAM required for PostScript.

◊Minimum of 4 megabytes of RAM required for "duplex" (front/back) printing.



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Table 1: Features of PostScript Printers, continued

	Kyocera Q-8010 ★★★	LaserMAX 1000 Personal Typesetter ★★	MacProducts MagicPrint ★★★½	Mirror Technology Mirror Image ★★★½
List price	$6,995; for test, $7,515**	$7,995	$2,500	$2,997
Comments	Fast text. Slow graphics. Intelligent port and emulation switching.	Compatibility problems. Improved image quality not up to 1,000-dpi claim.	Good buy if you don't need Type 1. Avoid firmware revision 3.00.	Good buy if you don't need Type 1. Incompatibilities.
Specifications				
Printer type	PostScript clone	PostScript clone	PostScript clone	PostScript clone
Engine, type	Kyocera, laser	Canon, laser	Casio LCS-130, LCS	Casio LCS-130, LCS
Engine life (pages)	indefinite††	300,000	300,000	300,000
Monthly duty cycle (pages)	10,000	5,000	5,000	5,000
Resolution, with enhancements	300 dpi	400 dpi; 1,000 dpi	300 dpi	300 dpi
Microprocessor, clock speed	68020 Motorola, 12 MHz	proprietary	Weitek RISC 8200, 4 MHz	Weitek RISC 8200, 4 MHz
Pages per minute	10 ppm	8 ppm	6 ppm	6 ppm
RAM (standard, max.; upgrades)	1 MB "user" + 4 MB video RAM; 1 MB, $520	6 MB	3 MB	3 MB
Hard-disk drive (standard, opt.)	none	none	none	none
Interfaces	parallel, serial, LocalTalk	video (LaserMAX custom NuBus)	parallel, serial, LocalTalk	parallel, serial, LocalTalk
Printer emulations	Diablo 630, HP LaserJet II	none	none	none
Software				
Number of fonts in ROM, type	35, Bitstream (hinted)	135, NA	39, Bitstream (hinted)	39, Bitstream (hinted)
Fonts supported	Type 1, 3	Type 1	Type 3	Type 3
Bundled software	none	printer drivers	Altsys' Metamorphosis	printer utilities
Paper handling				
Paper output (image up, down)	down	down	down	down
Paper stock min./max. (pounds)	16/24 lb	16/35 lb	16/24 lb	16/22 lb
No. of trays, page capacity (each)	1, 250	1, 200	1, 100	1, 100
Paper sizes	letter, A4, B5 legal tray, $95	A4, letter, legal	letter, legal, A4, B5	letter, legal, A4, B5
Other features/options	simultaneous ports, three IC font cards; 1,000-sheet feeder, $895	none	extra tray, $24	none
Envelope tray (capacity, option)	none	none	none	none
Replacement supplies				
OPC (drum)/copies	$179.95/10,000	$195/1,500	$199/20,000	$257/20,000
Toner/copies	$39.95/3,000 $169.95/50,000 (developer)	NA	$100 (3-pack)/6,000	$125 (3-pack)/6,000
Other				
Dimensions (W x D x H, in.)*	16.9 x 17.7 x 12.6	18 x 19 x 9.1	15.7 x 13.4 x 9.1	15.7 x 13.4 x 9.1
Weight	57.3 lb	38 lb	35.2 lb	35.2 lb
Warranty	90 days	engine, 90 days; controller, 1 year	1 year, specials available	1 year, 90 days on-site
Manufacturer	Kyocera Unison, Inc. 1321 Harbor Bay Parkway Alameda, CA 94501 (800) 367-7437 (415) 748-6680	LaserMAX Systems 7150 Shady Oak Road Eden Prairie, MN 55344 (612) 944-9696	MacProducts USA, Inc. 8303 Mopac Expwy Suite 218 Austin, TX 78759 (800) 622-3475 (512) 343-9441	Mirror Technology 2644 Patton Road Roseville, MN 55113 (800) 654-5294 (612) 633-4450

*With tray.

**Tested with optional 68881 math coprocessor and 1-megabyte RAM upgrade.

††Kyocera will replace any and all engine parts as required.

MAXimize Your Macintosh...

Until recently, high-resolution output also meant high cost. Not anymore.

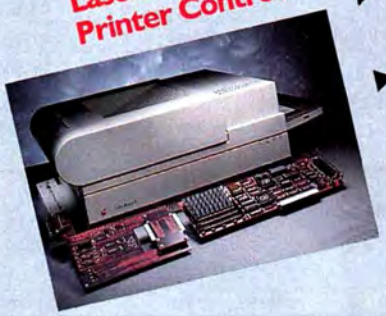
Personal Typesetting by LaserMAX lets you maximize your Macintosh — at an affordable price.

LaserMAX 1000 Personal Typesetter



- Produces camera-ready type on plain paper.
- Delivers precise 1000 x 1000 TurboRes output.
- Eliminates the use of toxic chemicals, photo paper and the expense of traditional typesetting.
- Includes 135 world-class typefaces.
- Affordably priced at $7,995.

LaserMAX MX6 Printer Controller



- Produces Near-Typeset Quality on plain paper from your Apple LaserWriter™.
- Delivers crisp 800 x 800 TurboRes or 400 x 400 TurboRes output.
- Three models to choose from: 2, 4 and 6MB of RAM. All models are upgradable to the LaserMAX 1000 Personal Typesetter.
- Prices start at only $2,795.

Plain Paper

Our TurboRes technology gives you camera-ready copy on plain paper. This means no more last-minute trips to the Lino shop. No more hoping the Lino shop is still open. No more special paper, messy bottles and toxic chemicals. And no more costly typesetting bills.

No Jaggies

Our LaserMAX 1000 Personal Typesetter provides 1000 x 1000 TurboRes output at an affordable $7,995. Or if you already own any Apple LaserWriter™, our MX6 printer controllers upgrade your output to either 400 or 800 dots per inch.

High Performance

If low cost and high resolution are not enough, then consider our printing speed. Using our Advanced Printing Mode, our products communicate directly with applications and can print up to 20 times faster than a PostScript™ printer.

135 Typefaces

Every LaserMAX Personal Typesetter includes 135 typefaces and Adobe Type 1 font support. The LaserMAX 1000 and MX6 printer controllers work with the entire Macintosh II line of products (II, IIx, IIcx, IIci, IIfx, and beyond).

Apple Laserwriter
(300 x 300)
Abc

MX6 Controller
(800 x 800 TurboRes)
Abc

LaserMax 1000
(1000 x 1000 TurboRes)
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All text for this ad was printed from a LaserMAX 1000 Personal Typesetter at 1000 x 1000 TurboRES.

For more information, Call LaserMAX at (612) 944-9696 Dept. #138

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First in Personal Typesetting

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612-944-9696 FAX 612-944-9151

Table 1: Features of PostScript Printers, continued

	NEC Silentwriter LC 890XL ★★½	NEC Silentwriter2 290 ★★★	NewGen TurboPS/480 ★★½	Printware 720 IQ Professional Laser Imager ★★★
List price	$5,995	$3,995	$7,495	$11,990
Comments	Fast. Flexible. Poorest image quality.	Nice compact design. New laser engine. Faster, cheaper than NT.	Compatibility problems. Good potential.	Excellent image quality. Most compatible hi-res clone. Very slow.
Specifications				
Printer type	PostScript	PostScript	PostScript clone	PostScript clone
Engine, type	NEC LC 800, LED	Canon UX, laser	Canon SX, laser	Printware, laser diode
Engine life (pages)	600,000	300,000	300,000	1,200,000
Monthly duty cycle (pages)	5,000	5,000	5,000	20,000
Resolution, with enhancements	300 dpi	300 dpi	800 dpi x 400 dpi	1,200 dpi x 600 dpi
Microprocessor, clock speed	Motorola 68020, 16.7 MHz	Motorola 68000, 16.7 MHz	Intel 80960 KB RISC, 20 MHz	Motorola 68000, 19.6 MHz
Pages per minute	8 ppm	8 ppm	8 ppm	8 ppm
RAM (standard, max.; upgrades)	4 MB, 8 MB max.	2 MB, 4 MB max.; 2 MB, $995	5 MB	4 MB, 8 MB max.; 4 MB, $1,990
Hard-disk drive (standard, opt.)	20 MB optional	none	none	20 MB
Interfaces	parallel, serial, SCSI, LocalTalk	parallel, serial, LocalTalk	parallel, serial, SCSI, LocalTalk	parallel, serial, SCSI, LocalTalk
Printer emulations	HP LaserJet+, Diablo 630	HP LaserJet+	HP LaserJet II, Epson LQ-800, HPGL plotter	none
Software				
Number of fonts in ROM, type	35, Adobe (hinted)	35, Adobe (hinted)	35, Bitstream	35, Bitstream
Fonts supported	Type 1, 3	Type 1	Type 1, 3	Printware fonts, Type 1, Type 3
Bundled software	drivers, utilities	drivers, utilities	drivers, utilities	utilities
Paper handling				
Paper output (image up, down)	up, down	up, down	up, down	up
Paper stock min./max. (pounds)	16/24 lb	16/34 lb	16/35 lb	16/24 lb
No. of trays, page capacity (each)	2, 250	1, 200	1, 200	1, 250
Paper sizes	letter, legal, A4, B5	letter, legal	A4, B5, letter, legal	letter, legal, A5, A4, B5, 8.5 x 5.5 in.
Other features/options	250-sheet facedown stacker; faceup exit tray, $85	none	none	spot color◊◊
Envelope tray (capacity, option)	none	15, optional, $89	15, optional, $89	none
Replacement supplies				
OPC (drum)/copies	$145/7,000	$125/4,000	$129/4,000§§	$615/100,000
Toner/copies	$24/3,000	NA	NA	$39/5,000
Other				
Dimensions (W x D x H, in.)*	19 x 21 [25*] x 11 [20*]	24.5 x 17.3 x 11.4	18 x 25.3 x 9.1	18.5 [36*] x 19.25 x 12
Weight	68 lb	49 lb	46 lb	80 lb
Warranty	1 year, 90 days on-site	1 year, 90 days on-site	1 year	90 days
Manufacturer	NEC Technologies, Inc. 1414 Massachusetts Ave. Boxborough, MA 01719 (508) 264-8000	NEC Technologies, Inc. 1414 Massachusetts Ave. Boxborough, MA 01719 (508) 264-8000	NewGen Systems Corp. 17580 Newhope St. Fountain Valley, CA 92707 (714) 641-8600	Printware, Inc. 1385 Mendota Heights Road St. Paul, MN 55120 (800) 456-1400 (612) 456-1400

*With tray.

§§NewGen also sells a Hi-Density Black toner cartridge ($195 for 4,000 copies) and a Hi-Resolution toner cartridge ($195 for 4,000 copies).

◊◊Spot color can be added on a second pass through the printer, using a second red, blue, or brown toner station.



70 years in optics are helping us develop quality images in some new places.

You know the company. We've been creating quality images for a long time. But you may not associate us with peripherals. The fact is, for years we've been supplying components for printers, scanners and optical disks. As well as copiers and fax machines.

Our expertise stems from 70 years of design in optics and electronics. Plus recent innovations such as a split-head design in optical disk drives for faster access times. A unique, single-piece folded optics scanning head to improve scanner image quality and reliability. And laser scanning technology that's the heart of several of today's popular laser printers.

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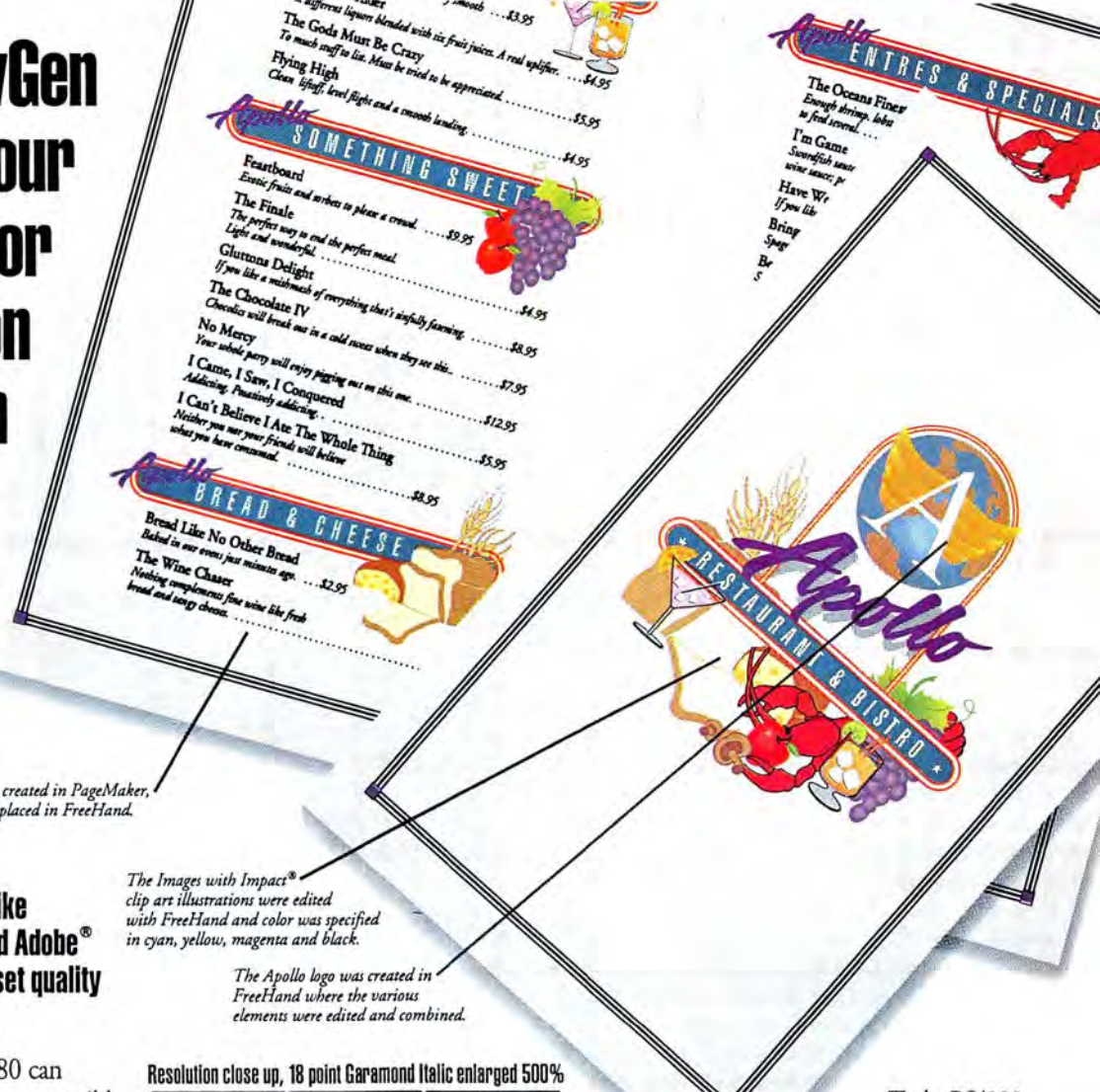
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Table 1: Features of PostScript Printers, continued

	QMS PS-810 Turbo ★★★★	Texas Instruments microLaser PS35 ★★★★½	Varityper VT600P ★★★★
List price	$5,495	$2,999	$16,995
Comments	Faster than NTX. Slightly better image quality.	Small, elegant design. Best price/performance for personal market.	Highest-quality output. Hard to maintain. Expensive.
Specifications			
Printer type	PostScript	PostScript	PostScript
Engine, type	Canon SX, laser	Sharp Ipia, laser	NA, laser
Engine life (pages)	300,000	200,000	600,000
Monthly duty cycle (pages)	5,000	3,000	15,000
Resolution, with enhancements	300 dpi	300 dpi	600 dpi
Microprocessor, clock speed	Motorola 68020, 20 MHz	Motorola 68000, 12.5 MHz	Motorola 68020, 16.7 MHz
Pages per minute	8 ppm	6 ppm	12 ppm
RAM (standard; max.; upgrades)	2 MB; 8 MB max.; 1 MB, $595; 2 MB, $995	1.5 MB; 4.5 MB max.; 1 MB, $495	8 MB
Hard-disk drive (standard, opt.)	opt. 20 MB, $999; 40 MB, $1,499	none	20 MB, 42 MB
Interfaces	parallel, serial, SCSI, LocalTalk	parallel, serial, LocalTalk	parallel, serial, LocalTalk
Printer emulations	HP LaserJet+, HPGL plotter	HP LaserJet II	none
Software			
Number of fonts in ROM, type	39, Adobe (hinted)	35, Adobe (hinted)	35, Adobe (hinted)
Fonts supported	Type 1, 3	Type 1, 3	Type 1, 3
Bundled software	setup utilities	none	Print Master utility
Paper handling			
Paper output (image up, down)	up, down	up, down	up
Paper stock min./max. (pounds)	16/35 lb	16/24 lb	16/20 lb
No. of trays, page capacity (each)	1, 200	1, 250	1, 200
Paper sizes	letter, A4, legal	letter, legal, A4, B5, executive	letter, legal, A4, B4
Other features/options	BigBin Sheetfeeder, $795 (1,000-sheet); 820 model with two paper bins, $6,495	none	image-density control legal tray, $139; A4 tray, $119; B4 tray, $139; 11 x 17 model, $22,995
Envelope tray (capacity, option)	15, optional, $75	40	none
Replacement supplies			
OPC (drum)/copies	$130/4,000	$189/40,000	$748/24,000
Toner/copies	NA	$69/3,000 $149/25,000 (developer)	$18/2,000 (8 micron) $149/15,000 (developer)
Other			
Dimensions (W x D x H, in.)*	18 x 25 x 9.1	13.4 x 14.2 x 10.9	23 [43*] x 21 x 19
Weight	44 lb	33.5 lb	171 lb
Warranty	1 year	1 year	90 days or 5,000 prints
Manufacturer	QMS, Inc. 1 Magnum Pass Mobile, AL 36618 (800) 631-2692 (205) 633-4300	Texas Instruments, Inc. P.O. Box 202230 Austin, TX 78720-2230 (800) 527-3500	Varityper 11 Mount Pleasant Ave. East Hanover, NJ 07936 (800) 631-8134 (201) 887-8000

*With tray.

Let NewGen satisfy your hunger for high-resolution with an affordable 800 dpi printer!



Text for the menu was created in PageMaker, saved as EPS files and placed in FreeHand.

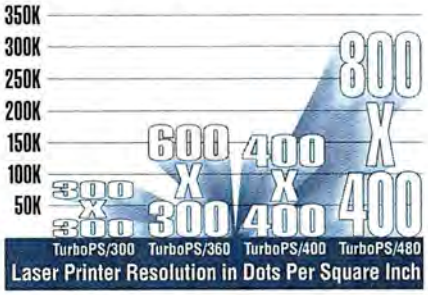
The Images with Impact® clip art illustrations were edited with FreeHand and color was specified in cyan, yellow, magenta and black.

The Apollo logo was created in FreeHand where the various elements were edited and combined.

Add powerful applications like PageMaker,® FreeHand® and Adobe® Type Fonts to produce typeset quality output at your own facility.

The NewGen TurboPS/480 can produce PostScript® language compatible output at 800 x 400 dpi, nearly four times the resolution of other laser printers. And when we say PostScript compatible, we mean it, including Type 1 fonts, special effects and EPS files from all your favorite applications and programs.

The NewGen TurboPS/480 is a complete printer with built-in AppleTalk,® parallel and serial ports. And unlike some printers, it works in mixed Mac-PC environments, and it doesn't require an internal PC processing board or dedicated server.



Resolution close up, 18 point Garamond Italic enlarged 500%



300 x 300 dpi	800 x 400 dpi	600 x 600 dpi
LaserWriter II	NewGen PS/480	Varityper VT-600

To show you how confident we are that you'll be impressed with 800 x 400 dpi output, we printed this page at actual size, including the menu which was output as color separations.

What does all this resolution and compatibility cost? Very little. The TurboPS/480 – with 800 x 400 dpi and RISC performance – lists for about 25% to 50% less than its competitors, while our TurboPS/400, TurboPS/360 and TurboPS/300 laser printers cost less than slower 300 and 400 dpi PostScript language printers.

If you have an appetite for high-speed, high-resolution PostScript language printing, call 714/641-8900 today to get your TurboPS evaluation kit.

Dealer inquiries welcome.



This ad was created and separated on a TurboPS printer. For information about its production, contact NewGen Corporation.

newgen **NewGen Systems Corporation**™
17580 Newhope Street, Fountain Valley, CA 92708
Telephone (714) 641-8900 FAX (714) 641-2800

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Dealers please circle 54 on reader service card.

The Next Wave of Personal PostScript Printers

On the horizon: five fast, affordable printers that bring the precision of PostScript to your desktop

When shopping for your own personal PostScript printer, you don't ask for much, right? You'd be satisfied with excellent image quality, speedy printing, durable construction, and precise PostScript performance. And you want to spend only a couple of thousand dollars, max. One problem, however, is that affordable high-quality

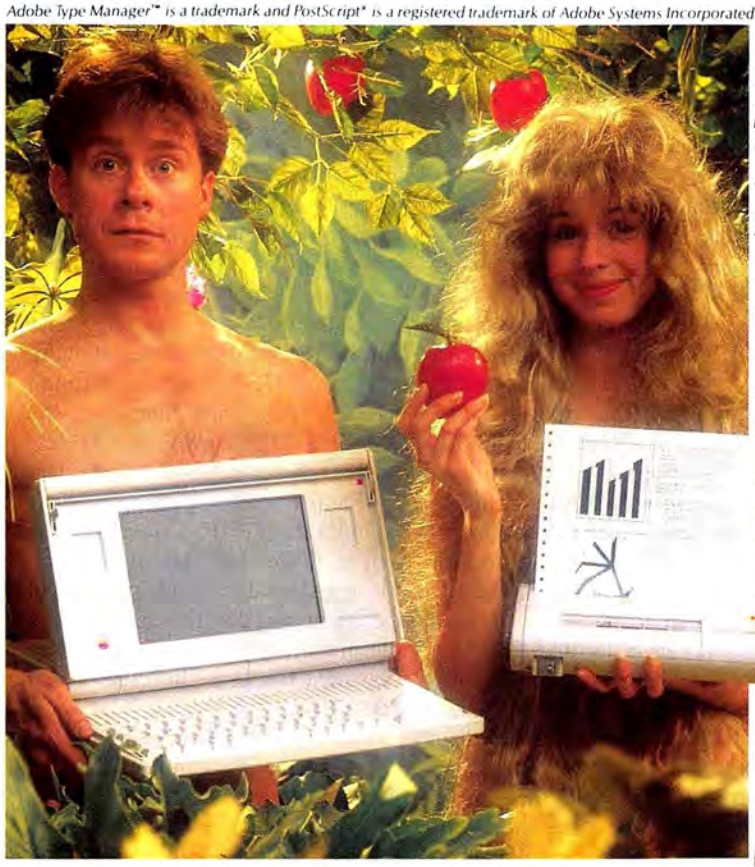
BY PAUL YI AND THE MACUSER LABS STAFF



PHOTOGRAPHY: TIM PACURA

Five beta personal PostScript printers (clockwise from left): the Abaton LaserScript, the Apple Personal LaserWriter NT, the Qume CrystalPrint Publisher II, the QMS PS-410, and the GCC Business LaserPrinter IIS.

Adobe Type Manager™ is a trademark and PostScript® is a registered trademark of Adobe Systems Incorporated.



Introducing the Kodak Diconix M150 plus printer. It travels with any portable or desktop Mac computer, so you can print anytime, anywhere.

Just think of all the things you can do if you carry a Diconix printer with your Macintosh computer. Those last-minute improvements on the presentation. The letters and reports that could be on their way right now. And, because it's so small and quiet, it works as well on the desktop as it does on the road.

It's all easy with the new Kodak Diconix M150 plus printer. It's easy to carry (3.1 lbs.), prints PostScript®-quality outline fonts using Adobe Type Manager™ software, as well as presentation graphics. No printer in the world is quieter, smaller or lighter. Go ahead, give in to temptation, call for the name of your nearest dealer in the U.S. or Canada: 1 800 344-0006.



Macintosh computer and new Kodak Diconix printer

WHAT'S ONE WITHOUT THE OTHER?

KODAK

The new vision of Kodak

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Beta PostScript Printers

PostScript printers are few and far between.

But help is on the way. As the MacUser Labs staff was preparing "The Letter-Perfect PostScript Printer" (in this issue), we discovered five soon-to-be-released printers that will please the most discriminating — and frugal — shoppers. At that time, these beta beauties weren't ready to ship (most should be shipping by the time you read this), but we acquired prerelease units and put them through our exhaustive suite of PostScript-printer tests.

The results were astonishing — so much so that we decided not to wait until all five were available at your friendly neighborhood computer store before we gave you the good news. So here's a first look at the Qume CrystalPrint Publisher II, the QMS PS-410, the GCC Business LaserPrinter IIS, the Apple Personal LaserWriter NT, and the Abaton LaserScript. Each should sell for less than $3,000 at street prices and should outpace others that sell for twice as much. That's right: faster *and* cheaper. Just how do they do it?

Taking the RISC

Some PostScript printers are now using a RISC (reduced instruction set computer) chip as their processor. A RISC printer is faster than a non-RISC printer because RISC technology favors speed over versatility. RISC processors perform a simpler set of low-level instructions faster than do the 68000 series of Motorola processors used in all Macs and all current Adobe PostScript printers. Because they're faster than 68000s, you can expect to see more RISC printers in the near future. Although today's RISC printers are clones that use only nonstandard PostScript, expect true Adobe PostScript to be available on RISC printers from companies such as Dataproducts by the first quarter of 1991.

Front-runner in the new crop of RISC-based personal printers is the 300-dpi Qume CrystalPrint Publisher II (CPP II), the fastest PostScript printer MacUser Labs has ever seen. Based on a Weitek RISC processor and a non-Adobe PostScript *interpreter* (the combination of hardware and software that turns PostScript commands into a printable bit map), the Qume CPP II blasts through graphics files faster than does the QMS PS-810 Turbo, the fastest graphics printer in "The Letter-Perfect PostScript Printer." The 6-ppm (pages per minute) CCP II is slower than the 8-ppm QMS PS-810 only when printing simple text and spreadsheet documents that don't require complex interpretation. On any other printing job, the CCP II is the clear speed champion.

In addition to speed, the CPP II corrects two of the main deficiencies found in its predecessor, the CrystalPrint Publisher I, in that it provides Adobe Type 1 compatibility and manual feed. Although it uses a Bitstream rasterizer and Bitstream fonts, the new CPP II can now accept Adobe Type 1 fonts (minus the *hints* necessary for perfect rendition of

PostScript Evolution or Revolution?

There are wars and rumors of wars. When Apple first announced its new TrueType font standard, PostScript users were up in arms. Their fear of impending obsolescence disappeared when Apple assured them that TrueType would be fully compatible with PostScript printers (see the "Living with TrueType and System 7" sidebar in "The Letter-Perfect PostScript Printer" in this issue). This is no war, just a rumor.

Another jolt — and a more serious one — came when Apple announced its adoption of Microsoft's TrueImage PDL (page-description language), an alternative to Adobe's PostScript. Although itself a clone of PostScript, TrueImage promises to shake things up, because it's a clone like no other: With the muscle of Microsoft and the backing of Apple, TrueImage can challenge Adobe PostScript as a potential new standard for printer manufacturers to build into their machines. What's more, TrueImage will use TrueType as its core font technology and will challenge Adobe PostScript as the industry-standard PDL for future printers. This is no rumor. This is war.

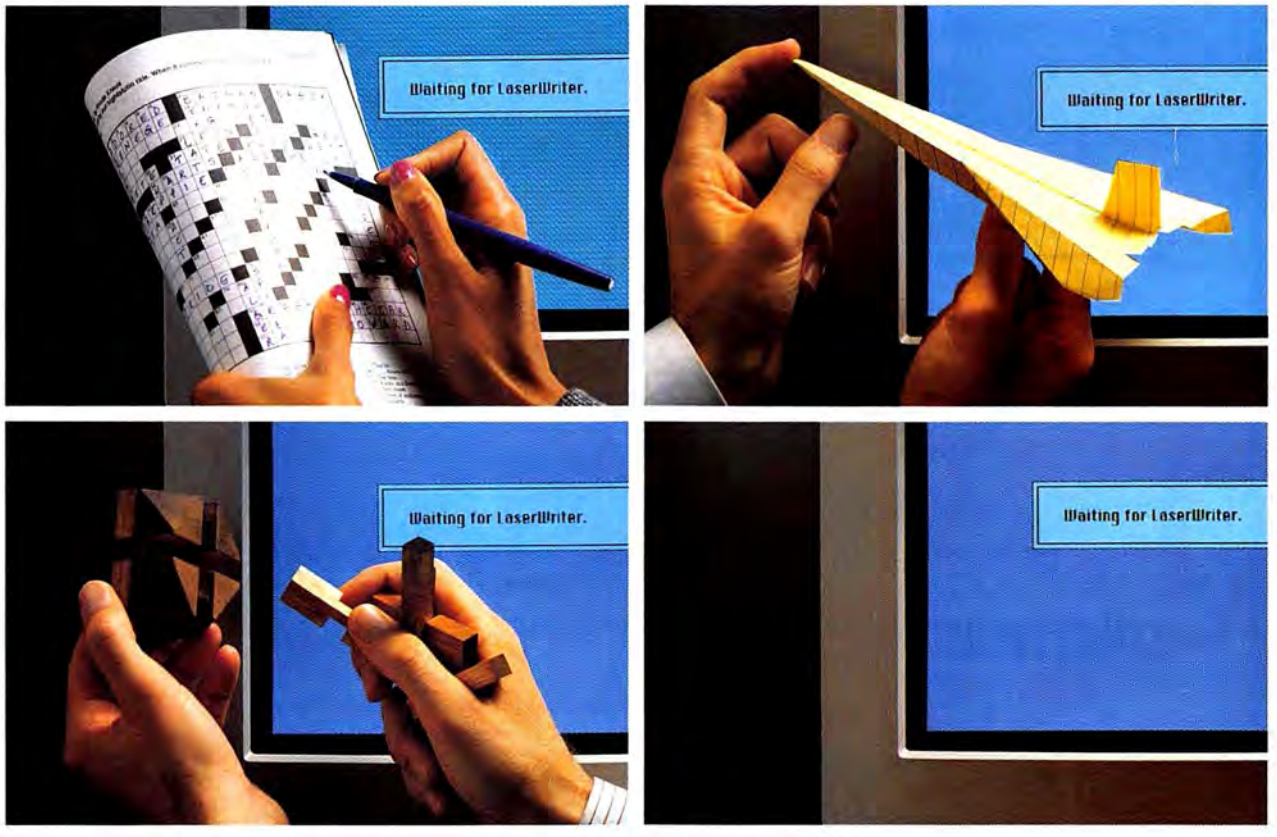
Adobe's first response to this challenge is PostScript Level 2: leaner and meaner than the original PostScript; available on more processor platforms; and compatible with the new, fast RISC-based printers. Dataproducts, for example, recently announced a PostScript Level 2 printer using a Weitek RISC processor that it plans to ship in the first quarter of 1991.

But speed is not everything. PostScript Level 2 printers promise additional features such as data compression, new pattern and form caching for greater speed, new halftoning algorithms, composite fonts, device-independent color spaces, and support for printer-specific features.

Level 2's compression algorithms will provide a data compression of up to 50 to 1 for some files. Fewer bytes will be sent over AppleTalk, greatly speeding up color work, in which files can be tens of megabytes in size. Halftoning algorithms will improve the look of color separations. Form and pattern caching will allow user-defined base forms to be cached between the printing of pages, for more efficient and faster production of business documents such as insurance forms. Composite fonts will allow more foreign languages to be supported, such as the Japanese kanji alphabet, which is made up of basic characters that combine to form new characters. Color consistency will be ensured by the use of a CIE-based color model that can be defined objectively, independent of the color range of any device. And a new universal printer driver will be able to address different printers' idiosyncrasies.

How all this affects the Microsoft/Apple agreements remains to be seen, because no printers yet exist that use TrueImage. In our testing of the new Abaton LaserScript, the first printer to use the Bauer PDL, which is the precursor of TrueImage, we found no compatibility problems beyond its inability to read Type 1 fonts — a limitation shared by most clone printers. According to Microsoft, TrueImage will overcome this hurdle. Also, Microsoft promises to make the TrueImage code available to developers — an unspoken challenge to Adobe to do the same with all aspects of PostScript and the first shot in the upcoming PDL war.

Idle Macs Are The Devil's Playground.

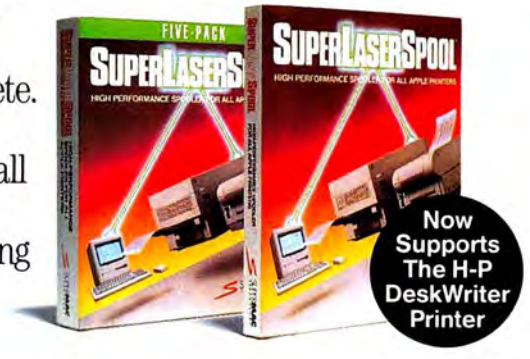


SuperLaserSpool™ makes "Waiting for LaserWriter®" a thing of the past, and lets everyone get back to work. Immediately. Because it takes care of printing in the background, while you take care of business in the foreground.

SuperLaserSpool comes complete with the LaserQueue™ desk accessory for efficient document handling—to prioritize or redirect documents to other printers. It includes document preview, and notifies users when print jobs are complete. Plus SuperLaserSpool works with just about any printer your Mac can drive. It also supports virtually all Macintosh® applications, including PageMaker.®

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Beta PostScript Printers

Figure 1: BETA Printing Speeds

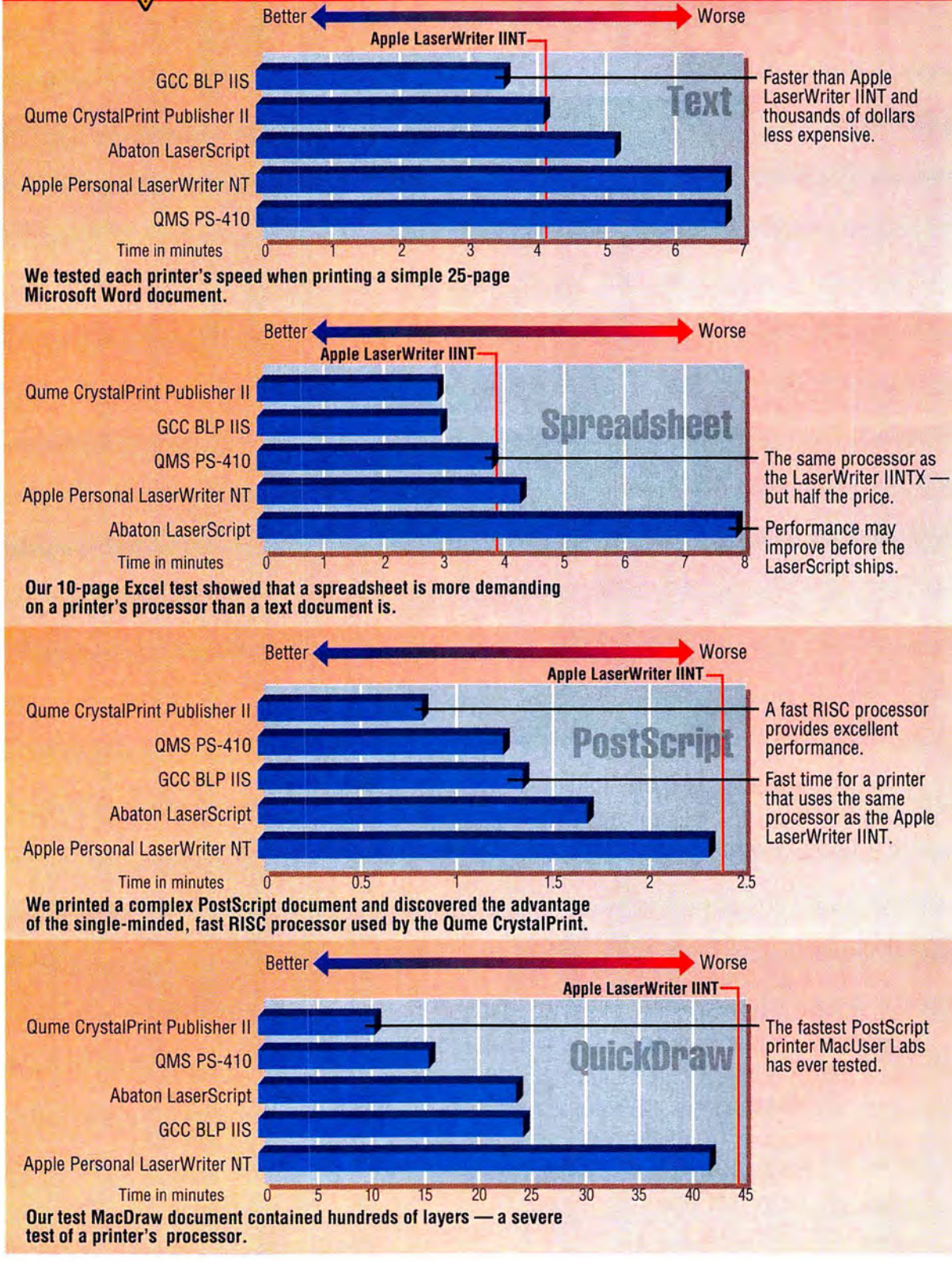


Image Club Graphics PostScript Typeface Library

new VERSION 1.5 ATM COMPATIBLE!
Image Club Typeface Library is now available in Adobe type 1 font format and compatible with Adobe Type Manager. Upgrades - $10 per font.

Gothic Demi
Gothic Oblique
Light w/Swash
Light Italic w/Swash
Demi w/Swash
Demi Italic w/Swash
Bold w/Swash

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Aquarius 10
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Bookman CONTOUR W/SWASH

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Brody

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Caldonia ITALIC
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Caslon Antique
Caslon Antique ITALIC

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Caslon NO. 224 BOOK ITALIC
Caslon NO. 224 BOLD
Caslon NO. 224 BOLD ITAL

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Castle GREY

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Century BOOK ITALIC
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Delphin No. 1

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This ad was created on a Mac II using Aldus PageMaker 3.02, Adobe Illustrator 1.83, Silicon Beach Digital Darkroom. The text was set with the Futura & Futura Condensed families from the Image Club Typeface Library and output as negatives on a Linotronic L300 PostScript imagesetter.

600 Typefaces

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The Art&Type Vendor CD ROM uses a special program to unlock typefaces and clip art from the CD ROM as they are required. The Vendor costs $199 and includes 20 fonts and 1 volume of Digit-Art™ EPS clip art. Buying additional fonts or clip art from the Vendor is as easy as making a toll-free phone call. Image Club will provide an access key that unlocks the fonts or clip art images from the CD ROM. With the Art&Type Vendor you'll never miss another deadline waiting for a font to arrive.

Macintosh Version

Image Club fonts include both type 3 and type 1 PostScript fonts which guarantees compatibility with virtually any Macintosh application including Adobe Type Manager™ (ATM). With ATM you can print Image Club type on non-PostScript printers such as an ImageWriter or a LaserWriter 11SC. Our fonts also include PostScript artwork files. With Illustrator™ or Freehand™ you can customize characters, creating unique type-based designs.

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Image Club type is compatible with Ventura™, PageMaker™ (Windows) and Corel Draw™ for use with any PostScript compatible printer. Image Club fonts will work with non-PostScript printers like an HP LaserJet™ when combined with PostScript software such as PreScript™, Freedom of Press™ or a PostScript card.

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Whether you buy fonts on diskette, from the Art&Type Vendor CD ROM, or the whole library on the LetterPress CD ROM, our pricing and discount schedule make it easy.

Each font $25. Minimum purchase $50.
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Letterpress CD ROM full disc (all 600 fonts)	$4999
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some small type sizes), so desktop publishers will no longer need to shelve their Adobe font collections if they buy a Qume. Unfortunately, the CPP II doesn't have a SCSI port for attaching a font-laden hard-disk drive, but at a list price of $3,995 (and a probable street price well below that), it will still be a best buy in the personal printer category.

Three Personal Motorolas

The second-fastest beta printer we tested was the QMS PS-410, which uses a Motorola 68020 processor running true Adobe PostScript. For half the price of other 68020 Adobe-sanctioned PostScript printers on the market, the PS-410 gives you equivalent speed, and it uses the latest Adobe font rasterizer and font outlines. For full compatibility with high-end Adobe PostScript imagesetters, the QMS PS-410 has an edge over clones such as the CPP II. The QMS PS-410's lack of a SCSI port is offset somewhat by its 45 resident fonts (2 additional typefaces — Garamond and Helvetica Condensed — each in 5 styles, instead of the usual 35 standard fonts in Apple's LaserWriter IIs and many others).

What's more, the QMS PS-410 has an important solution for network printing: simultaneous multiprinter emulation and multiport access. Although other PostScript printers offer three interfaces — LocalTalk, serial, and parallel — most let you use only one interface at any one time. The PS-410, on the other hand, like the Kyocera Q-8010 PostScript clone discussed in "The Letter-Perfect PostScript Printer," can accept data through all three active ports *simultaneously* — you never have to leave your desk to switch ports or emulation manually. This feature offers networks with mixed Macintosh and PC populations an elegant solution for painless printing.

The third-fastest new printer is the GCC Business LaserPrinter IIS (BLP IIS), which uses a Motorola 68000 running true Adobe PostScript. Helped by an 8-ppm Okidata LED engine and the latest Adobe font rasterizer, the BLP IIS is the fastest personal 68000-based printer we've seen. It's also the only personal printer to offer a SCSI interface as one choice in an innovative modular-interface solution: You can choose a LocalTalk-and-SCSI board or a serial-and-parallel one. This approach recognizes that most Mac users won't need the PC connections, although they might want to attach a hard-disk drive.

Apple's Personal LaserWriter NT is the slowest of the new personal printers. It uses a Motorola 68000 and a 4-ppm Canon engine, the same used in the Hewlett-Packard LaserJet IIP and the QMS PS-410. The Personal LaserWriter NT is much faster than the LaserJet IIP but significantly slower than the PS-410. It is, however, faster than the earlier Apple LaserWriter IINT when printing graphics, even though the LaserWriter IINT uses an 8-ppm Canon engine.

The Personal LaserWriter NT is the only printer that uses Apple's new LocalTalk interface chip (the same chip the Mac IIfx uses) to improve LocalTalk speed by cutting down communications overhead. This chip's effectiveness was proved in our page-layout test, which included an enormous, 686K gray-scale image. When we removed this large image from the document, the Personal LaserWriter NT's performance advantage over its earlier cousin, the LaserWriter IINT, was reduced from 12 percent to 3 percent. The Personal LaserWriter NT also uses Adobe's latest and fastest font rasterizer, which further improves performance over that of the earlier Apple machine.

The Bauer Clone

Our final new kid on the block, the Abaton LaserScript, is the first printer that uses the Bauer PostScript clone

Table 1: Comparison of Page-Description Languages

	Adobe PostScript Level 1	Adobe PostScript Level 2	Microsoft TrueImage
Rasterizer	Adobe font rasterizer (ATM*)	Adobe font rasterizer (ATM)	Apple's TrueType
Fonts	Adobe Type 1	Adobe Type 1	Apple's TrueType
Font description	cubic	cubic	quadratic
Pros	Industry standard. Type 1 fonts widely used. Compatible with existing PostScript programs.	Faster than Level 1. Four compression types. Printer-specific support. Compatible with Type 1. Device-independent color. Compatible with Level 1.	Uses TrueType. Compatible with Type 1. Multiprocessor support. Cheaper printers.
Cons	Cannot rasterize TrueType. Incompatible with Level 2. Dated and slow. Heavy Adobe royalties. Limited processor support.	Cannot rasterize TrueType. Heavy Adobe royalties.	Potentially incompatible with PostScript Level 2. Specific features unannounced.

*ATM (Adobe Type Manager) was first included in early 1990.

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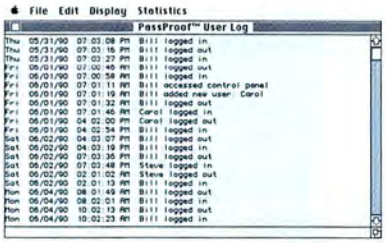


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to hit the Mac market. The Bauer clone is significant because Microsoft is employing it as the foundation for TrueImage, the new PostScript clone that Apple will use in its future PostScript printers (see the "PostScript Evolution or Revolution?" sidebar).

TrueImage will use Apple's new font technology, TrueType, which Apple claims has faster performance than Adobe's font-rasterizing technology (see the "Living with TrueType and System 7" sidebar in "The Letter-Perfect PostScript Printer").

The Abaton LaserScript uses a National Instruments processor and a 6-ppm TEC laser engine. The LaserScript's performance times were between those of the Apple Personal LaserWriter NT and the GCC BLP IIS. We should see future LaserScripts using faster National Instruments processors, including a line of RISC processors. We experienced no PostScript-compatibility problems with the LaserScript — it's a clean clone. Abaton also plans to offer upgrades to TrueImage when it arrives.

Paul Yi is an associate editor at *MacUser*.

The BETA Bottom Line

We can't give you the final, definitive word on these printers (they hadn't shipped by press time, and final tweaks are inevitable), but from our preliminary tests, the **Qume CrystalPrint Publisher II** and **QMS PS-410** look like standouts. Their high performance and low price will shake up the entire PostScript-printer market.

But — as usual — time waits for no PostScript printer. By the time you read this, Qume should be shipping the **CrystalPrint Express.** This speedster will employ a 6-megahertz Weitek RISC processor running a 12-ppm Sanyo engine. (The CrystalPrint Publisher II, the fastest of the new printers we tested, uses a 4-megahertz processor running a 6-ppm engine.) We expect the Express to live up to its name and emerge as the fastest of all PostScript printers for both text and graphics. And besides speed, the CrystalPrint Express will also improve horizontal resolution from the normal 300 dpi to a tweaked 600 dpi. Its list price will be $5,595.

Table 2: Features of Beta Personal PostScript Printers

	Abaton LaserScript	Apple Personal LaserWriter NT	GCC Business LaserPrinter IIS	QMS PS-410	Qume CrystalPrint Publisher II
Printer type	clone (Bauer)	PostScript	PostScript	PostScript	clone
List price	$2,995	$3,299	$2,899*	$2,795	$3,995
Comments	First Bauer clone. Decent speed.	Large paper tray. Attractive design. Decent speed.	SCSI option. Fast text output.	Fast graphics output. Concurrent active ports. EST.†	Fastest graphics. Type 1 support. Small paper tray.
Engine manufacturer	TEC	Canon	Okidata	Canon	Casio
Imaging method	laser	laser	LED	laser	LCD
Pages per minute	6 ppm	4 ppm	8 ppm	4 ppm	6 ppm
Resolution (dots per in.)	300 dpi	300 dpi	300 dpi	300 dpi	300 dpi
Microprocessor	NS32CG16§	Motorola 68000	Motorola 68000	Motorola 68020	Weitek XL-8200 RISC
Clock speed (megahertz)	15 MHz	12 MHz	16.67 MHz	16.67 MHz	4 MHz
Interface options	serial, parallel	serial	serial, parallel, SCSI	serial, parallel	serial, parallel
Printer emulations	HP LaserJet Series II	HP LaserJet+, Diablo 630	HP LaserJet Series II, Diablo 630	HP LaserJet Series II, HP-GL optional	HP LaserJet Series II
Number of fonts	35	37	35	45	39
ROM fonts	Bitstream	Adobe	Adobe	Adobe	Bitstream
Type 1 support	no	yes	yes	yes	yes (no hinting)
Paper trays	1 tray, 150 sheets	1 tray, 250 sheets	1 tray, 200 sheets	1 tray, 50 sheets	1 tray, 100 sheets
Warranty	1 year	1 year	1 year	1 year	1 year
Manufacturer	Abaton 48431 Milmont Drive Fremont, CA 94538 (800) 444-5321	Apple Computer, Inc. 20525 Mariani Ave. Cupertino, CA 95014 (408) 996-1010	GCC Technologies, Inc. 580 Winter St. Waltham, MA 02154 (617) 890-0880	QMS, Inc. 1 Magnum Pass Mobile, AL 36618 (800) 631-2692 (205) 633-4300	Qume 500 Yosemite Drive Milpitas, CA 95935 (800) 223-2479 (408) 942-4000

*A 4-ppm version, the BLP II, is available for $2,399.

†Emulation Sensing Technology, which automatically detects the necessary emulation and switches accordingly.

§This processor is manufactured by National Semiconductor.



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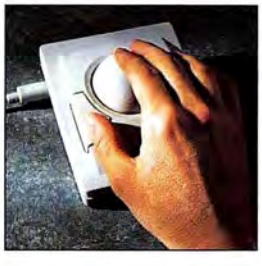
MacUser gave it the coveted Five Mice. And the readers of Macworld magazine voted it "Best Input Device" — not just once but *four years in a row.*

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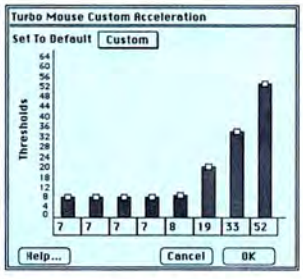
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Do-It-Yourself Printer Testing

Become an honorary MacUser Labs technician with these easy steps to judging PostScript-printer perfection.

Not many people have their own private lab for product testing. Even if you're prepared to wrestle with a few products on your own before you buy, chances are you can't thoroughly test the whole range of products in a given category.

That's where we come in. For this issue, MacUser Labs tested 24 PostScript printers (19 released and 5 beta) for speed, image quality, and ease of use. We've drawn our own conclusions, which you can read in "The Letter-Perfect PostScript Printer" and "The Next Wave of Personal PostScript Printers" in this issue. But you don't have to be from Missouri to have a show-me, see-for-yourself attitude — in this article, we give you the tools and techniques you need to make your own decisions.

BY MICHAEL MILEY AND PAUL YI



PHOTOGRAPHY: PETER ALAN GOULD

Figure 1: The MacUser Labs PostScript-Printer Test Page



Gray-scale image. **Look carefully at this 200-dpi gray-scale image containing 256 levels of gray. Check for details in the map, flower, and binoculars. Check the shading of the mountains in the background.**

Gray ramp. **Check for distinct levels of gray that change at an even rate from black to white.**

Text. **Examine the 72-point type, noticing especially the serif in Times and the bold strokes in Helvetica. Then read the 12- and 18-point type for character spacing and smoothness. Check 6-point text for dropouts and clumping of characters. (You may want to use a jewelers' loupe.)**

Art. **Check the woman's face for curves and subtle shades of gray. Shadows and highlights should be just that, not smudges and washouts.**

Circles, squares, and pointing finger. **Check the circles within squares for good hairline definition and geometry. The pointing finger should have solid blacks with little spreading beyond the image's boundaries.**

If you've narrowed down your options with the help of our recommendations, you may still want to do some of your own on-site testing at your dealer. We're providing you with the same PostScript-printer test page we used in our Labs research so that you can do your own image-quality testing. This test is designed to let you examine precisely, on one convenient page, a range of output elements, from lines to gray scales (see Figure 1).

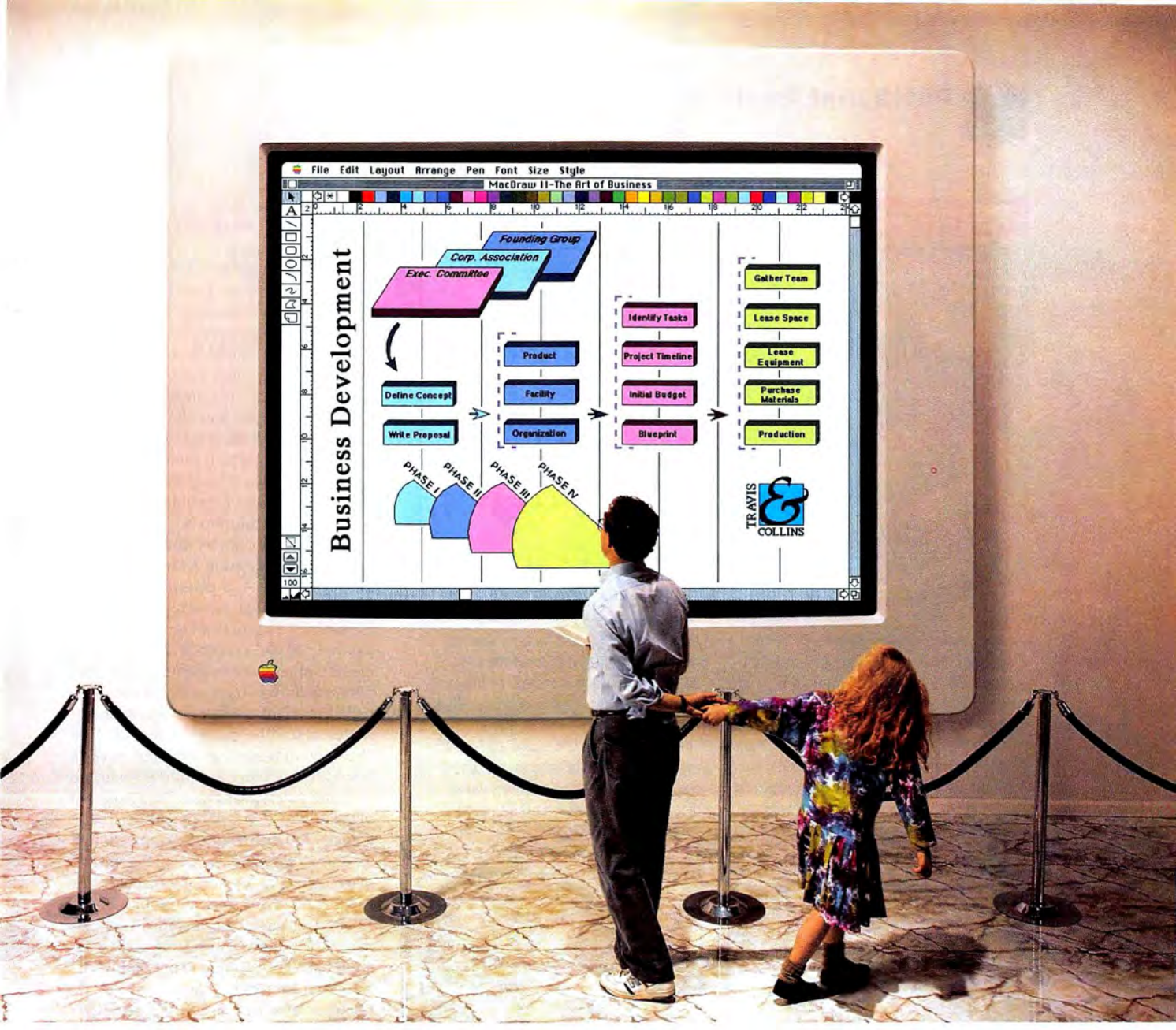
You'll find this test page on *MacUser*'s on-line service, Zmac, in the download area. We've provided it in two forms: as a PageMaker file that you can open directly from PageMaker (versions 3.02 or later) and as a PostScript file that you can download to any PostScript device with a PostScript-file downloader, such as Send PS from Adobe. (We've also provided a sample of our test page at the end of this article, output from a 1,270-dpi Linotronic imagesetter. Although it's at a resolution a normal toner-based laser printer can't match, you can use it as a yardstick of what to shoot for.) We've compressed both files with StuffIt — which is also available on Zmac — but they're still big. Be prepared to tie up your modem and Mac for some time, even at 2,400 bps. (Because the test files are too large to fit on a floppy disk, you may want to ask your dealer to download them directly.)

Once you've done that, it's time to print the test page on your prospective PostScript-printer purchase. But first, have the dealer print out half a dozen completely black pages to prime the printer. This little trick will better prepare the printer than letting it warm up for the recommended half hour.

After you've printed your test page, carefully examine the output — we use a jewelers' loupe, or magnifying glass — to spot tiny details. Consider the individual quality of the various images on the page and any flaws you can detect in the overall printing quality.

Text, Lines, Grays, and Flaws

The higher the resolution of the printer you're testing, the better its image quality will be. An *a* printed at 600 dpi looks sharper and smoother than the same letter printed at 300 dpi. But resolution aside, other aspects of a printer's technology



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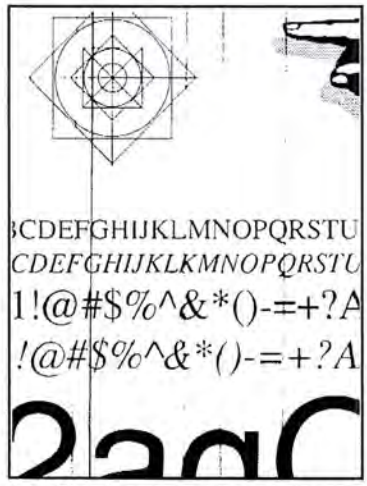
Figure 2: What's Wrong with This Page?



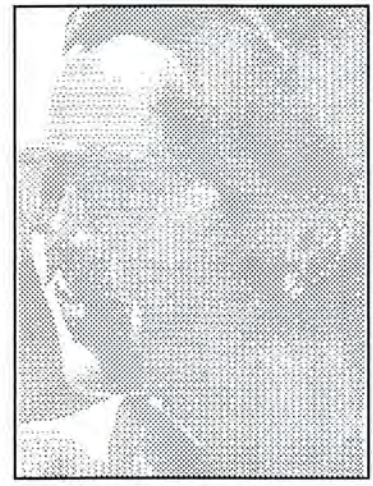
Poor image quality. This could be the fault of the paper you are using. If you want the highest-quality output possible on any laser printer, you should be using special "laser" paper (left) that is smoother and accepts toner better than does normal copier paper (right). The result of using laser paper is consistent blacks and better detail due to less spreading of toner.



Ragged text. There's nothing wrong with this sample. It's about the best 300-dpi output you can get. To improve on it, you would need to go to a higher resolution, such as 400 or 600 dpi. There are some tricks, such as better *kerning* (spacing between letter pairs) and *leading* (spacing between lines), that can compensate for the ragged curves of 300-dpi text.



Streaking. Streaking and errant black marks on a page indicate that something is wrong with either the printer's drum or its fuser. A loose particle or scratch on the drum or fuser roller can cause streaks on the page. Check both and make sure they are clean, taking care not to touch the drum or hot fuser roller with your fingers. The drum is sensitive to light, so don't let light shine directly into the printer.



Light or dark prints. Prints that come out too dark or too light indicate a density problem — too much or too little toner is going onto the paper. Printers that have density controls let you fix this. Adjust the density control to be either lighter or darker until the prints come out more to your liking. If you find the results are still unacceptable, replace the toner cartridge.

affect how it handles text, PostScript art, and gray scale. We designed our page to test all three things.

The test page's text is in Times and Helvetica, to expose how well a printer handles serif and nonserif typefaces, respectively. Both typefaces are industry standards and should be included with any PostScript printer you test. We tested the type in 6-, 12-, 18-, and 72-point sizes to let the printers show their prowess at producing small and large type. Note that printing 6-point type is tough, even if the printer uses *hinted fonts* that have been specially designed for rendering at small sizes and low resolutions.

For PostScript art, we chose a drawing of a person, created in Aldus FreeHand, and two others — a pointing finger and circles within squares — created in Adobe Illustrator. The person is an excellent example of the power of PostScript to create complex and beautiful images, and your printer will have to flex its muscles to do a good job in this case. The pointing finger taxes the printer's blacks. The circles-within-squares drawing reveals how well a printer can produce a hairline — a one-pixel-wide line at the resolution of the printer. (On a 300-dpi printer, that's a line 1/300 inch wide — skinny enough to show deficiencies in the printer's marking technology or any inaccuracies in the tracking or stepping of the drum.)

The test page also includes two elements that show a printer's gray-scale abilities: a gray ramp laid out both vertically and horizontally and a gray-scale image scanned in at 200 dpi with 256 levels of gray. The gray ramp shows a printer's available gray levels — around 26 for most 300-dpi printers. Here you should look for a gradual ramp of distinct levels of gray from white to black and watch for the washing out of highlights and lowlights. The scanned image should help you determine a printer's trade-off between subtler grays and sharper images. Typically, printers that give you sharper images may appear washed out in the subtle areas of white to light gray and of dark gray to black, whereas those with great grays may lose out on detail.

Finally, look for flaws in the printed image caused by defects in the toner, drum, or fuser. Scratches on the drum can cause streaking, and unmixed toner can cause clumping of characters — flaws that a new printer shouldn't have. If there are image flaws, ask for a new cartridge, and then print again.

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The power of Nisus not only lets you convert mainframe data, it lets you index every word in a document, and remove unwanted and nonessential words like "the, and, not, and of."

But the built-in word processing language isn't the only surprise in Nisus 3.0. It also has an integrated graphics capability that will let you do things that some layout programs can't such as rotate text, graphics, or even add arrows.

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001 51000K IBM      DL/1       001
A & M RECORDS            LOS ANGELES   CA90028   2134480037C365200275
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3350       01610298058IBM 3420       00813298100IBM 4245      002
A & M RECORDS            LOS ANGELES   CA90028   2134480037C365200275
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The sample above shows fixed length fields and fixed length records that are common in some mainframe files. That means you can not simply tell your conversion program to drop in tab or comma delimited spaces at the end of the text in each field. For most programs converting this would be complete chaos. And that's without eliminating the duplications and extracting just the information you want.

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POSTSCRIPT PRINTER TEST PAGE©

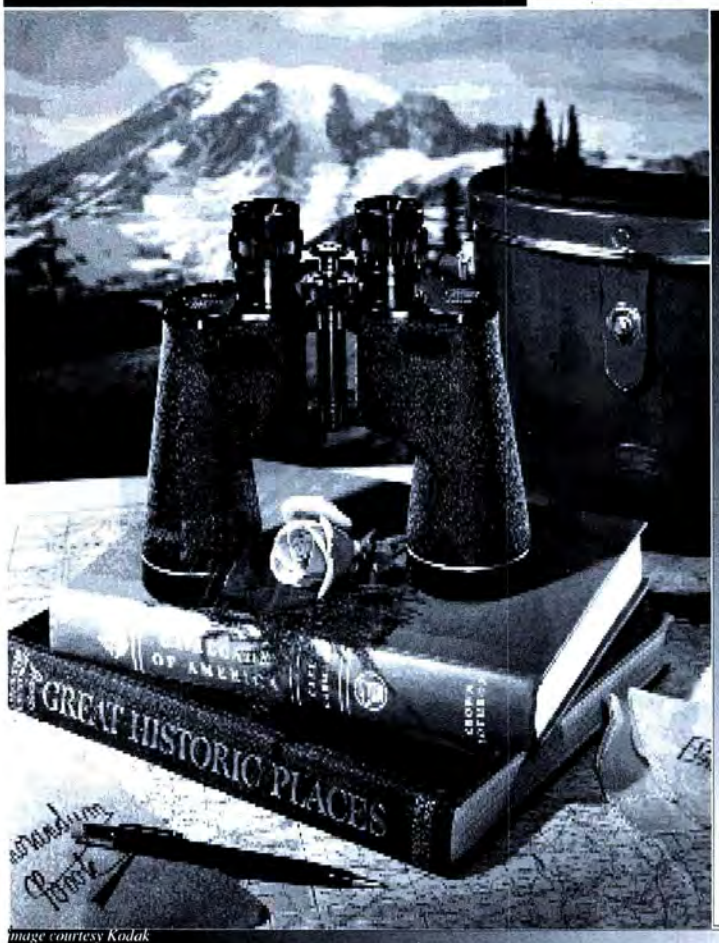


Image courtesy Kodak

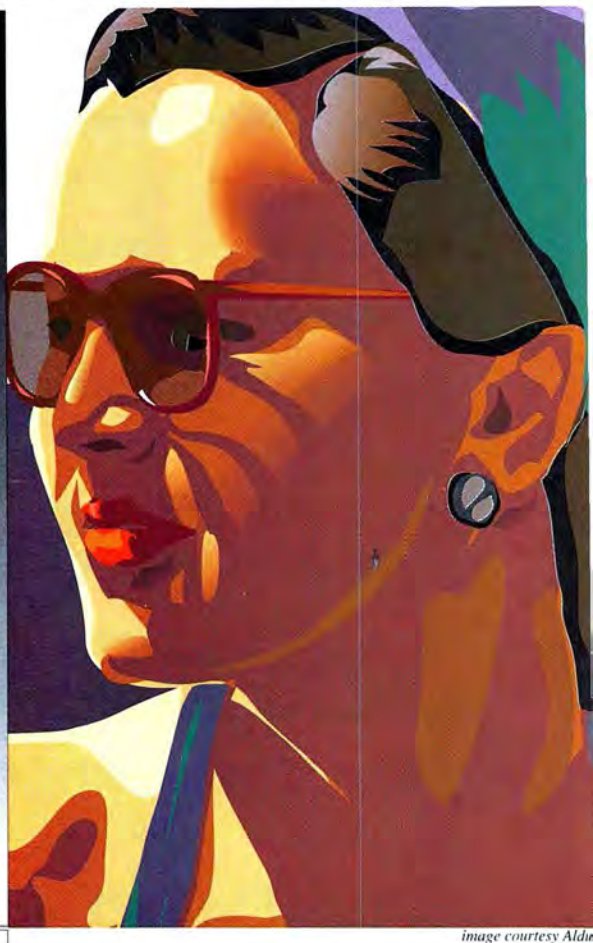
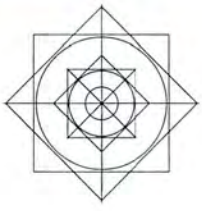


Image courtesy Aldu





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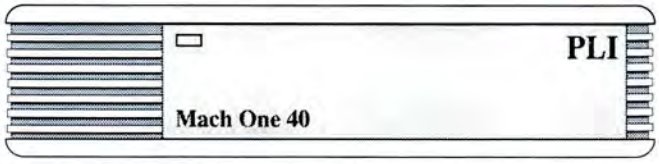
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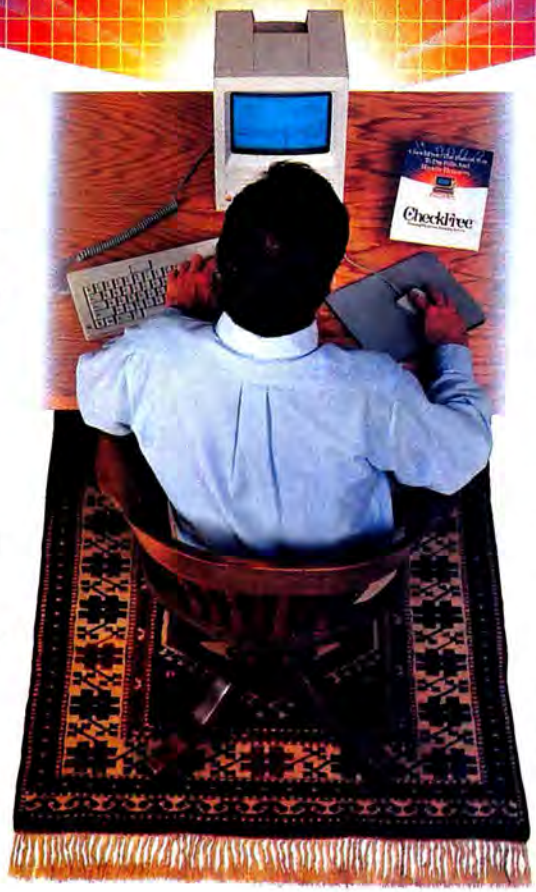
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THE GOLDEN AGE OF Gray Scale



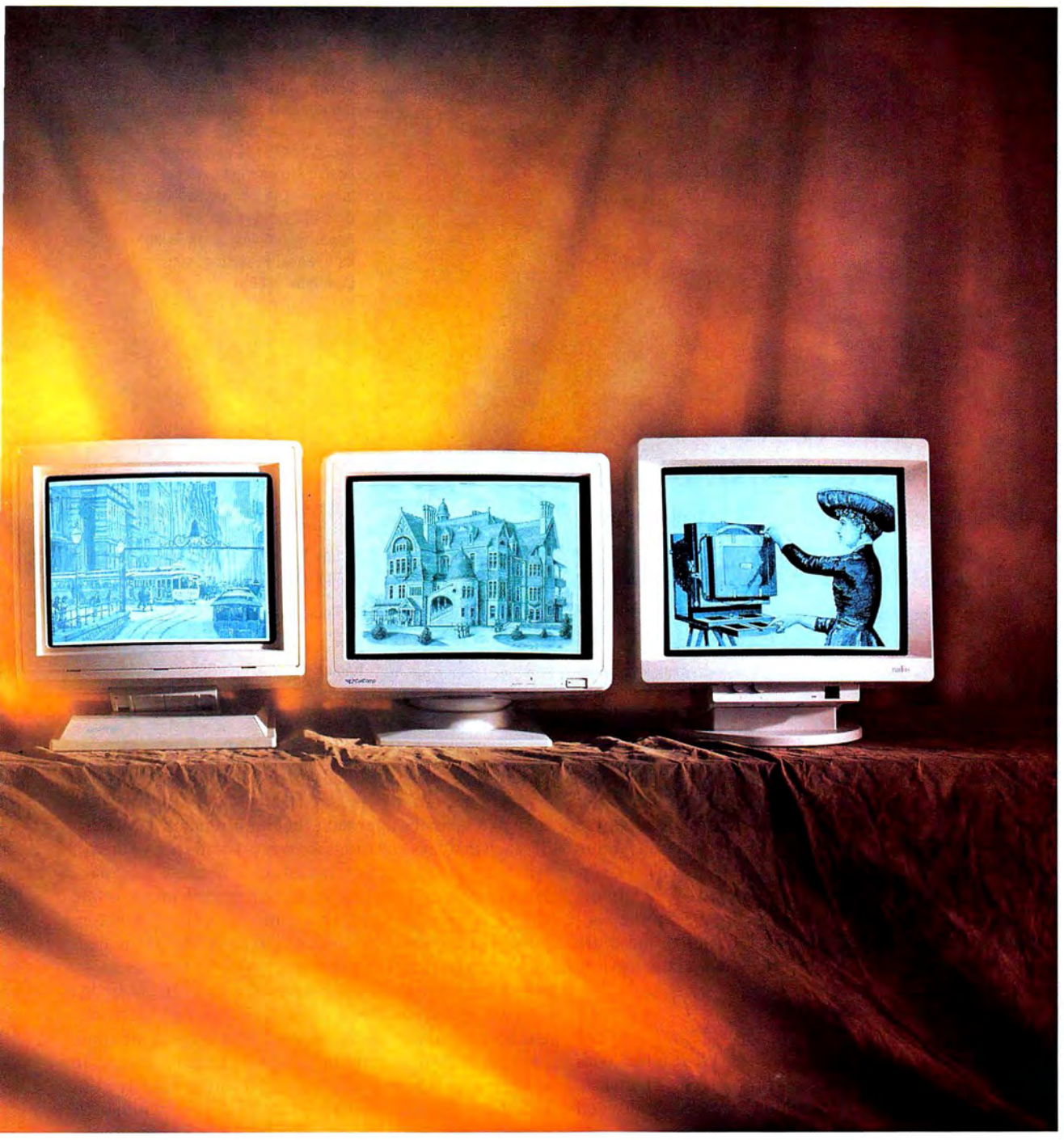
A quartet of new gray-scale display systems offers professional features and lower prices.

BY OWEN W. LINZMAYER AND THE MACUSER LABS STAFF

In the past year, the quality of gray-scale Mac display systems has jumped from merely adequate to simply superlative. And the good news gets better: While quality continues to go up, prices are still coming down. If your work involves page layout, graphic design, or image processing — and color is not a necessity — welcome to the Golden Age of gray.

In this report, MacUser Labs evaluates four new gray-scale display systems (monitors paired with NuBus video-interface cards): the CalComp DrawingCard GrayVision, Radius Two Page Display/21, RasterOps ClearVue/GS, and SuperMac 19" Platinum Display.

We subjected these newcomers to the same tests we used for our comprehensive gray-scale-display-system report of October 1989 ("Grading the Grays," page 182). We again checked focus, MTF (*modulation transfer function*, an objective test of image sharpness), screen geometry and brightness, gray linearity, and nuisance factors. All the tests were performed on a Mac II; only the RasterOps ClearVue/GS can be paired with a card designed specifically for the Mac SE/30. (Because they don't have color QuickDraw, the Mac 512K, Plus, SE, and Portable can't drive gray-scale display systems.)



PHOTOGRAPHY: TIM PACURA

Figure 1: Gray Linearity

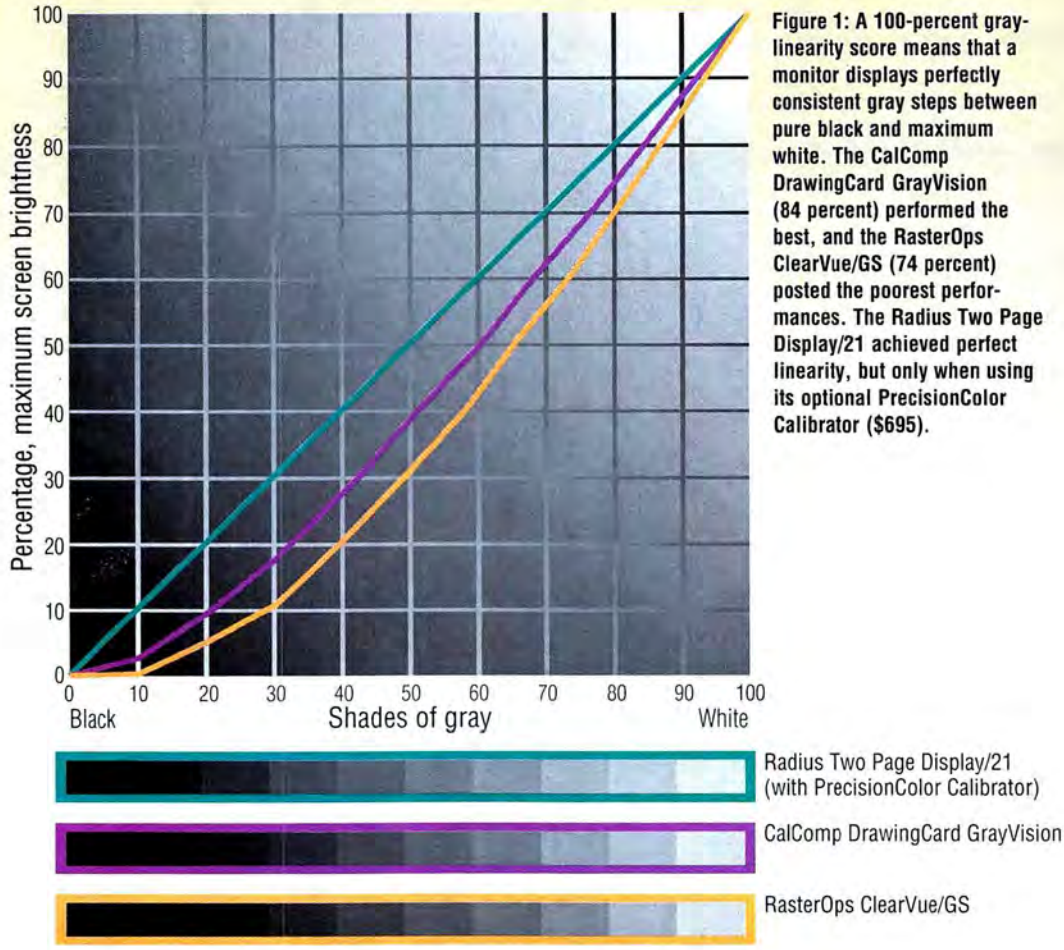


Figure 1: A 100-percent gray-linearity score means that a monitor displays perfectly consistent gray steps between pure black and maximum white. The CalComp DrawingCard GrayVision (84 percent) performed the best, and the RasterOps ClearVue/GS (74 percent) posted the poorest performances. The Radius Two Page Display/21 achieved perfect linearity, but only when using its optional PrecisionColor Calibrator ($695).

In general, the average price for a complete Mac II large-screen gray-scale display system has dropped significantly since the last time we surveyed the market. For example, the price of the top pick from last October — the 19-inch PCPC Shadowgraph — has been cut by more than one-third, to $1,728. The gray-scale display systems evaluated in this report range in price from $2,195 for the 19-inch RasterOps ClearVue/GS to $3,195 for the CalComp DrawingCard GrayVision. Of course, these are manufacturers' suggested retail prices; actual street prices may be substantially lower.

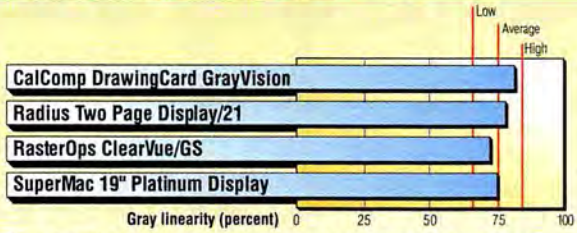
Is Bigger Better?

The 11 monitors we tested last year had tubes with diagonal measurements ranging from 12 to 21 inches. This time around, the four monitors are evenly divided into 19- and 21-inch models; both sizes are commonly referred to as two-page displays.

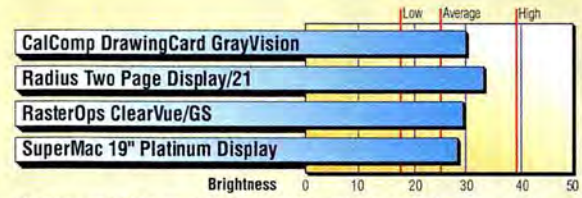
Two-page display is one of those ubiquitous phrases that have lost much of their original meaning. Strictly speaking, a two-page display should be able to show two entire letter-sized pages at 100 percent. Only 21-inch displays actually approach this requirement. However, 19-inch displays can often show most of the active area of two letter-sized pages at "actual size," because most page layouts normally include nonactive margin areas. Using the Fit in Window option built into virtually all desktop-publishing software, a 19-inch display produces a scaled-down image that should be acceptable to most users.

Screen size is not the only factor that affects image quality. *Pixel dimensions* (pixels are picture elements, the dots that make up the image on the screen) are more important than a monitor's diagonal measurement in determining how much information can be displayed. A monitor's pixel dimensions are the height and width of its screen as measured in pixels. With 1,152 x 882 pixels, the Radius Two Page Display/21 is the big-screen leader, able to display 30 percent more information than either of

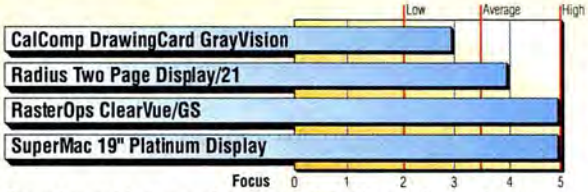
Figure 2: Monitor Performance



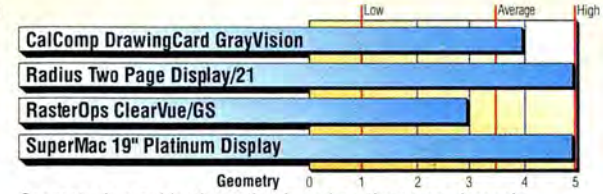
Gray linearity measures how accurately the display showed the range from black to white. Most monitors have no problem displaying a true black, but pure white depends on maximum screen brightness, and the accuracy of intermediate grays is the true test of linearity.



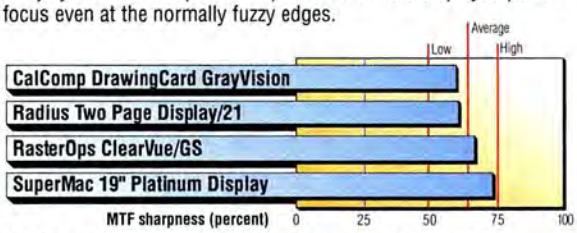
Brightness is the maximum usable light intensity (measured in footlamberts) without loss of normal focus. A brighter screen helps minimize the eyestrain caused by glare.



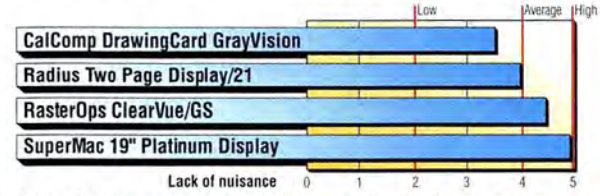
Focus is a subjective evaluation developed for each monitor by our jury. The RasterOps and SuperMac monitors displayed perfect focus even at the normally fuzzy edges.



Geometry is a subjective rating based on the screen image's apparent tilt, bowing outward, and pincushioning inward, along with any distortion of displayed squares, circles, and straight lines.



MTF sharpness, a purely objective test measuring contrast between thin black and white lines on-screen, confirmed our jury's subjective appraisal of focus.



Lack of nuisance subjectively rates a monitor for freedom from the combined nuisance factors of glare, flicker, jitter, electronic "noise," and uneven brightness/color.

Figure 2: For each of the six tests summarized here, the four gray-scale monitors received a rating represented by a horizontal bar (the longer the bar, the better the rating). Last year's high, average, and low scores are represented by red lines.

the 19-inch monitors, which each have 1,024 x 768 pixels.

The 21-inch Radius even surpasses the 21-inch CalComp DrawingCard GrayVision by packing its pixels slightly closer together. The Radius' pixel dimensions are 1,152 x 882, while the CalComp monitor displays 1,152 x 870 pixels. Purists claim that only monitors that show 72 dpi (dots per inch) yield true WYSIWYG (what you see is what you get) displays, since printers calculate image size based on this measurement. Documents displayed at "actual size" on screens with resolutions greater than 72 dpi appear somewhat reduced, and dot densities above 90 dpi may be difficult to read without zooming in. Our own experience reveals, however, that few people can differentiate between monitors with slightly different dpi ratings. Unfortunately, none of the displays let you adjust the number of dots per inch (pixel density) the way last year's runner-up, the E-Machines QuickView (formerly "Big Picture") Z21 IQ, does.

Gray Levels

Since the four monitors in this lab report are driven by 8-bit video cards, they are all capable of displaying the full range of 256 gray levels that is required for photographic-quality images. Furthermore, all but one of the video cards (CalComp DrawingCard) are color-capable — nice to know if you anticipate upgrading to a color monitor.

Ideally, a block of 50-percent gray should register half as bright as white. A monitor with poor *gray linearity* does not represent different shades of gray accurately and may display dark grays as pure black (see Figure 1). To evaluate gray linearity, we employed a Minolta LS-110 luminance meter to find out how well the monitors were able to display proportional levels of brightness. The CalComp DrawingCard GrayVision's linearity rating matched that of last year's linearity leader, the PCPC Shadowgraph. The other displays' linearity ratings were near the average ratings of the large-screen displays we

On the Horizon

Even as we were tearing down our test equipment and packing up the four display systems tested in this report, seven other display systems were on their way to market. Some are familiar two-page displays, whereas others support new features such as QuickDraw acceleration and antiradiation protection.

Nutmeg Systems' new 19" Gray Scale is a true WYSIWYG 8-bit display system that should be flicker-free, due to its high 78-hertz vertical refresh rate. Its antiglare screen meets tough European ergonomic standards. Bundled with Stepping Out II, the Nutmeg 19" Gray Scale lists for $1,899. Nutmeg Systems, Inc., 25 South Ave., New Canaan, CT 06840; (800) 777-8439 or (203) 966-3226.

New from Generation X is the gs/II, a 19-inch paper-white display featuring 1,024 x 768 resolution and a 75-hertz vertical refresh rate. The gs/II lists for $2,695. Generation X Technologies, Inc., 333 W. El Camino Real, Suite 310, Sunnyvale CA 94087; (408) 739-4570.

MegaGraphics now offers an improved MegaScreen Greyscale Display that has been redesigned for better focus, linearity, and MTF sharpness than the model we tested in our October 1989 report. The newer system has a lower price too: $2,698 for the Mac II (includes MegaScreen 2008 video card) and $2,948 for the SE/30 (includes MegaScreen 3008). MegaGraphics, Inc., 439 Calle San Pablo, Camarillo, CA 93012; (805) 484-3799.

PCPC has updated its Shadowgraph to 75-hertz vertical refresh to eliminate flicker. The new Shadowgraph II features the same Ikegami monitor and, sans flicker, should offer performance similar to that of the original Shadowgraph. PCPC now sells direct at $1,728 for the complete system. Personal Computer Peripherals Corp., 4710 Eisenhower Blvd., Building A-4, Tampa, FL 33634; (813) 884-3092.

SuperMac's recently announced 21-inch Platinum Two Page Display ($1,799), combined with the Spectrum/8 PDQ video card ($1,899), gives you a fast paper-white display with 8-bit QuickDraw acceleration. The 21-inch display features the same bonded antiglare panel as that of the 19" Platinum Display reviewed in this report and, thanks to the PDQ, promises snappier performance. The Spectrum/8 PDQ card drives the 19" Platinum Display, all SuperMac color displays, and Apple's High-Resolution RGB Monitor.

Sigma Designs now offers (for an additional $300) an antiradiation option for all its monochrome and gray-scale display systems. The antiradiation SilverView gray-scale system lists for $3,299 and features improved shielding and an OCLI antiglare coating. The standard SilverView was evaluated in our October 1989 report, earning a three-mouse rating and high marks for gray linearity. Sigma Designs, Inc., 46501 Landing Parkway, Fremont, CA 94538; (415) 770-0100.

Digital Technology International has the answer for tabloid- and broadsheet-newspaper-page layout. Its SpeedView is a 21-inch, 72-dpi portrait display that shows 870 x 1,152 pixels and 256 grays. The SpeedView lists for $3,195. Digital Technology International, 500 W. 1200 S., Orem, UT 84058; (801) 226-2984.

— Jeff Pittelkau



The 21-inch Digital Technology SpeedView can display a tabloid page at actual size — more than twice the viewing area of a standard portrait display (represented by the black rectangle).

evaluated in last year's gray-scale-display-system lab report.

In addition to having excellent gray linearity, the CalComp DrawingCard GrayVision is the only display that allows you to select different *gamma tables*. A gamma table allows you to tweak colors and gray levels to achieve optimum accuracy on different monitors; if your particular monitor doesn't represent a specific shade of gray correctly, then the adjusted gamma table will change the signal going to the CRT display. Too bad this feature in the CalComp monitor doesn't compensate for its poor focus.

If you require, and are therefore willing to pay for, exact gray linearity, you can automatically adjust the gamma table of the Radius Two Page Display/21 with the $695 Radius PrecisionColor Calibrator (see the Color Buyer's Guide, May '90, pages 15 and 27). Our test of the Radius monitor with the optional Calibrator produced 100-percent-perfect gray linearity.

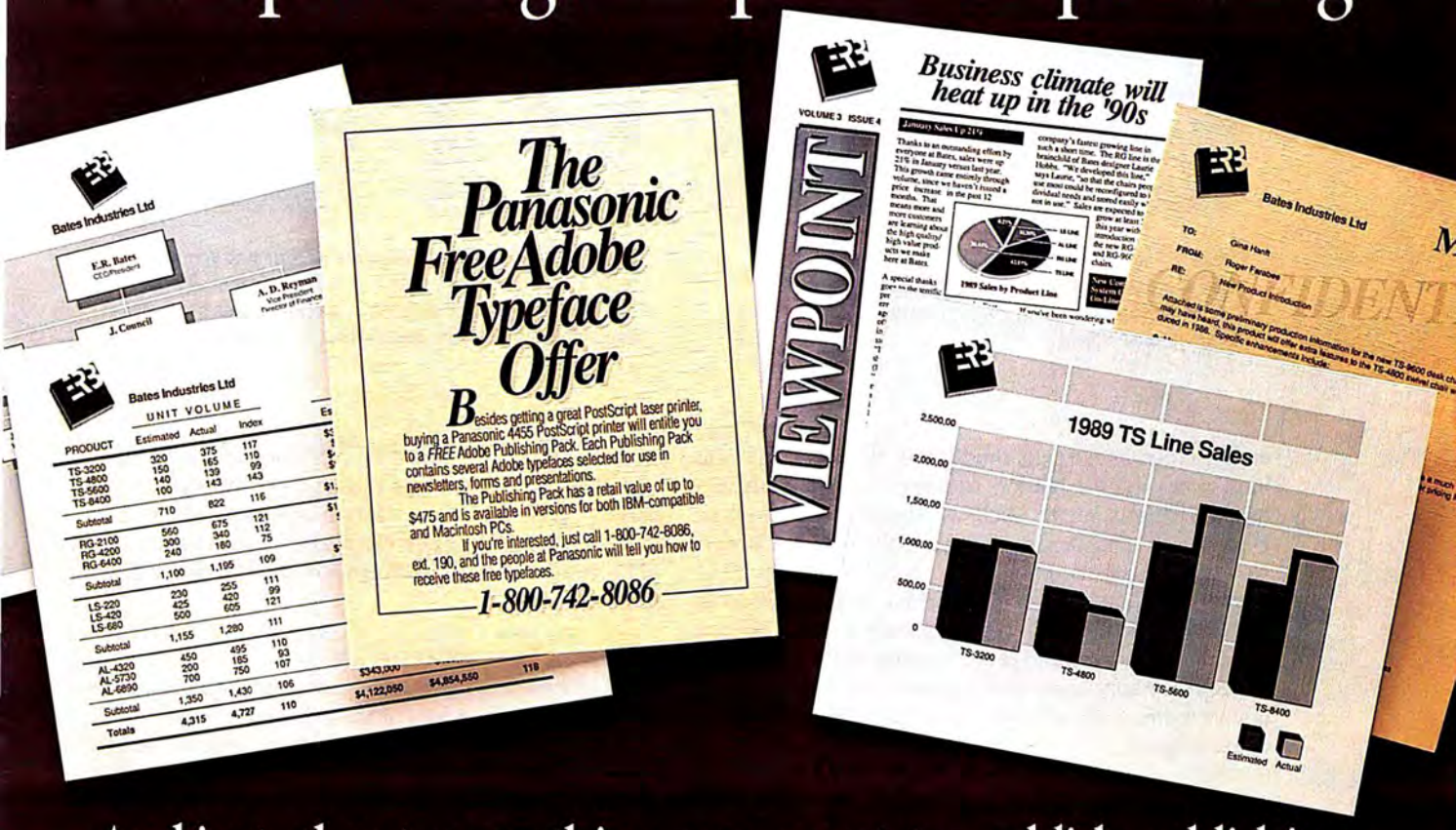
Special Software

The Radius Two Page Display/21 comes with a cdev that contains a nice collection of utilities. Among the features are tear-off menus, which eliminate the need to return the cursor all the way to the menu bar at the top of the Display/21's large screen to select commands. Also, you can enlarge the type on the menu bar to 16 points for easy reading. The Radius software allows you to capture cropped screen dumps in PICT2 format (a feature also available in third-party utilities such as Capture from Mainstay and Exposure from Preferred Publishers). The Radius cdev also lets you center dialog boxes and windows automatically behind the cursor.

Both the RasterOps and SuperMac display systems have hardware-based virtual desktops that trick programs into thinking the screen is much larger than their 1,024 x 768 pixels. Even if you can't see everything all at once with a virtual screen, you can move the cursor to the edge of the screen (instead of using the scroll bars) and the

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LPS-MAC

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Figure 3: Focus



Figure 3: The RasterOps ClearVue/GS (left) retains sharp focus at the screen edges. CalComp's DrawingCard GrayVision (right) smoothly renders accurate grays but suffers from soft focus.

Figure 4: Geometry



Figure 4: If truly circular circles are important to you, or if rectangles with reliable right angles really matter, beware of RasterOps' ClearVue/GS (left). The right image shows the SuperMac 19" Platinum Display's superb geometry.

entire screen image pans fluidly over to reveal what was hidden beyond the border. Although reliable software-based virtual screens, such as Stepping Out II from Berkeley System Design, are available, they work more slowly and less smoothly.

With the RasterOps and SuperMac displays, you can also zoom in to magnified Fat Bits mode with the press of a key. Hardware pan and zoom are slick features that must be seen to be appreciated, but the more video memory you devote to these features, the less is available for defining levels of gray.

Seeing Is Believing

No matter what the specifications tell you, the most important consideration when buying a monitor is what your eyes see. To judge subjective monitor characteristics — focus, geometry, glare, and other nuisance factors — we assembled a panel of experts to eyeball these four monitors (see Figure 2).

A monitor's sharpness, or focus, can make the difference between a finely striped graphic design and a featureless blob. Basically, focus determines how well you can see precise features. Focus is rarely uniform in all areas of a large CRT screen simultaneously, and focus is rarely as good at the edges of a monitor as it is in the center.

To our judges' experienced eyes, both the RasterOps and SuperMac monitors have perfect focus. Text characters are razor sharp right to the edges of the screen. The Radius monitor is very good but has a few weak areas near the edges; reducing the brightness does seem to eliminate these trouble spots, however. The CalComp monitor suffers noticeably from poor focus in large patches at both sides (see Figure 3).

For a more objective test of screen sharpness, we measured the horizontal and vertical MTF of each monitor, using a custom-built 300-dpi CCD (charge-coupled device) array. In nontechnical terms, this simply means we compared the contrast of thin black and white lines with that of large black and white areas. A monitor with perfect MTF sharpness (100 percent) would display stripes with the same contrast as that of larger areas. The MTF results correlated well with our subjective focus ratings.

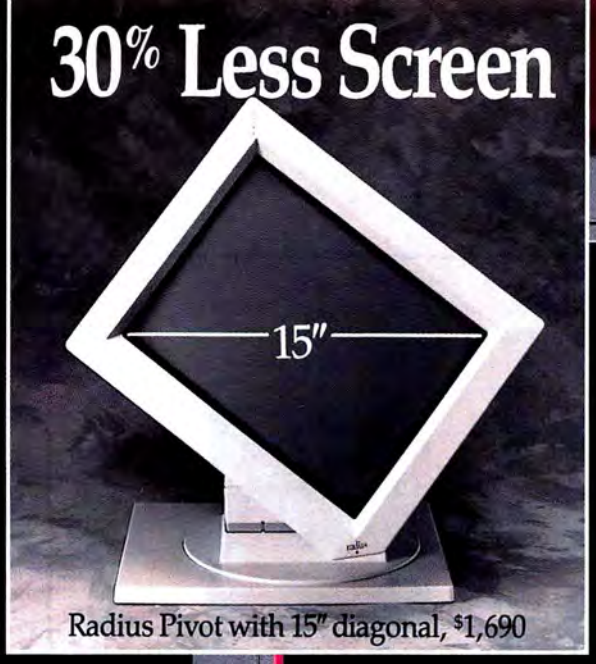
Squares, Eggs, and Eyestrain

Large monitors often have geometry problems, especially at the outer edges of their displays. Some have a slight inward or outward curve at the edge of the screen, or a screen image that tilts to one side. Others, particularly the larger models, display circles as ovals and squares as rectangles. Obviously, this is unacceptable when you're working with graphics, and distorted text can contribute to eyestrain.

We checked geometric precision with a modified version of Larry Pina's shareware program Test Pattern Generator (see Figure 4). Among other tests, it displays an image consisting of a large circle in the center of the screen and smaller circles in the corners; on good monitors with rectangular screen images, it displays five perfectly round circles. Poor monitors show severe pincushioning (inward curvature of the active screen edges), shrinking at the corners of the screen, or egg-shaped circles. The Radius and SuperMac monitors have the best geometry, and the RasterOps has the most distorted screen, with squashed circles in the corners and pincushioning along the right-hand side.

Brightness determines how intensely a pure-white image is projected from the screen, and contrast is the relative difference between dark areas and light areas. A bright screen image can assist in combatting glare, so make certain your monitor has a brightness range adequate to your needs. At 34 footlamberts, the Radius Two Page Display/21 was the brightest of the four monitors, and all the monitors were brighter, on average, than last year's crop.

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Radius Pivot with 15" diagonal, $1,690

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Monitor	Pivot	PixelView II
Screen Size (diagonal)	15"	19"
Viewing Area (sq. inches)	90.77	151.58
WYSIWYG (72dpi)	no	yes
Vertical Refresh (Hz)	69	78
100% Usable with Plus, SE	no	yes
Pop-Up or Tear-Off Menus	yes	yes
Cursor and Menu Sizing	yes	yes
Screen Saver	yes	yes
Screen Copy	no	yes
Full Year Warranty	yes	yes
Dealer Markup	yes	no
List Price	$1,690	$897

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* The Pivot can operate in the portrait mode only on the Mac Plus and SE.

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Capsule Reviews

CalComp DrawingCard GrayVision ..... ⚡⚡⚡

This expensive display system has few unique features and performed poorly on several of our tests. Even if CalComp were to reduce its price and provide a bunch of useful utilities, the monitor's display problems would be too serious to ignore.

Pros: Above-average brightness, gray linearity, and geometry ratings. WYSIWYG display. Glare protection. Tilt/swivel stand.

Cons: Below-average MTF sharpness, focus, and lack-of-nuisance ratings. No software. Video card not color-capable.

Manufactured by: CalComp, Inc., 2411 W. La Palma Ave., Anaheim, CA 92803; (800) 458-5888 or (714) 821-2000.

List Price: $3,195.



Radius Two Page Display/21 ..... ⚡⚡⚡⚡½

This monitor may not present perfect WYSIWYG, but it does display a lot of information. It performed well on all tests except MTF sharpness. Its lack of glare protection is a trade-off for its high brightness. A nice collection of utilities makes working with the large screen easier.

Pros: Excellent geometry. Linearity, brightness, focus, and lack-of-nuisance ratings above average. Large pixel dimensions. Color-capable card. Extensive utilities. Tilt/swivel stand.

Cons: Somewhat expensive. Below-average MTF-sharpness ratings. Not true WYSIWYG. No 2-bit (four gray levels) mode. No glare protection.

Manufactured by: Radius, Inc., 1710 Fortune Drive, San Jose, CA 95131; (800) 227-2795 or (408) 434-1010.

List Price: $3,190.



RasterOps ClearVue/GS ..... ⚡⚡⚡⚡

A flicker-free Ikegami tube explains this system's admirable performance. Its enormous virtual desktop and pan and zoom features combine to provide flexibility. The screen's chemical etch provides good glare protection without reducing brightness. Only poor linearity and geometry detract from this attractively priced system.

Pros: Excellent focus. Above-average brightness, MTF sharpness, and lack-of-nuisance ratings. WYSIWYG display. Color-capable card. Hardware pan and zoom. Virtual desktop. Glare protection. Tilt/swivel stand. SE/30 card available.

Cons: Below-average linearity and geometry.

Manufactured by: RasterOps, 2500 Walsh Ave., Santa Clara, CA 95051; (800) 468-7600 or (408) 562-4200.

List Price: $2,195.



SuperMac 19" Platinum Display ..... ⚡⚡⚡⚡⚡

This monitor leaves us searching for suitable superlatives. It performed so well in our benchmark tests and has such a complete feature set that we can't find fault with this exceptional display system.

Pros: Excellent focus, geometry, and lack-of-nuisance ratings. Above-average brightness and MTF-sharpness ratings. WYSIWYG display. Color-capable card. Hardware pan and zoom. Virtual desktop. Glare protection. Tilt/swivel stand.

Cons: None.

Manufactured by: SuperMac Technology, 485 Potrero Ave., Sunnyvale, CA 94086; (408) 245-2202.

List Price: $2,399.



No Nuisance Is Good News

MacUser Labs uses a unique nuisance factor to evaluate monitors. Our jury examines each display for lack of glare, flicker, jitter, noise, regulation, bandwidth, and uniformity problems. These observations are averaged into a single lack-of-nuisance rating from 0 to 5.

The SuperMac monitor was deemed nuisance-free, with a perfect rating of 5. The RasterOps display received excellent ratings in all categories except uniformity (the center of the screen had a yellowish tint, and the corners appeared darker). The Radius monitor also rated well, but the absence of glare protection caused the screen surface to imitate a mirror (you can correct this with one of the many third-party glare filters available from Kensington Microware, NoRad, and others). On the Radius unit, images also jittered a bit.

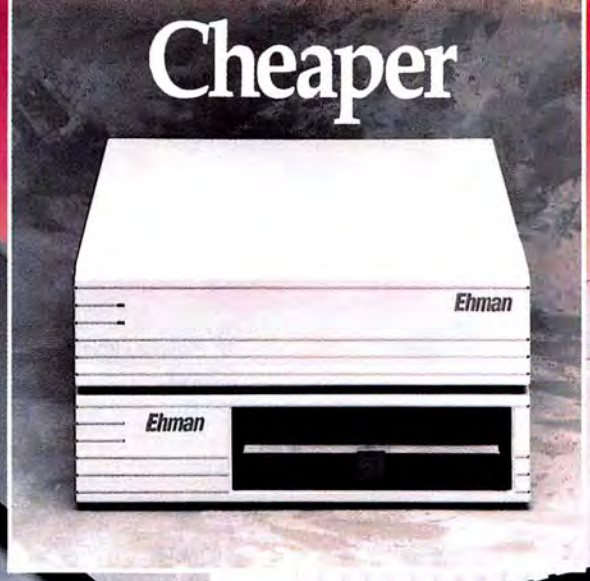
The CalComp display had the most problems. Tiny horizontal lines (noise) ran through white display areas, strong ghosting and shadows indicated bandwidth problems, and the silica coating provided only moderate glare protection.

Conclusion

Gray-scale display systems have improved noticeably in the past year. Overall performance and features have been enhanced and prices slashed. To find out how these four newcomers perform against last year's contenders, see the "Bottom Line" and "Capsule Reviews" sidebars.

Although he has a weakness for gray-scale monitors, Owen W. Linzmayer is a free-lancer whose life is so colorful that not even 32-bit QuickDraw can do it justice.

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Extended Warranty Available	no	yes
Leasing Program	no	yes
Trade-In Program	no	yes
48 Hour Repair	no	yes
10Mb Public Software	no	yes
Password Protection	no	yes
Partitioning & Drive Spanning	no	yes
Automated Back Up Software	yes	yes
Quick Keys (5-mouse rating)	no	yes
DiskTop (4.5-mouse rating)	no	yes
10 Additional CE Products	no	yes

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45	367	447
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135	727	797
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The Golden Age of Gray Scale

Table 1: Features of Gray-Scale Display Systems

	CalComp DrawingCard GrayVision	Radius Two Page Display/21	RasterOps ClearVue/GS	SuperMac 19" Platinum Display
Mouse rating	↕↕↕	↕↕↕↕½	↕↕↕↕	↕↕↕↕↕
List price	$3,195	$3,190	$2,195	$2,399
Hardware				
Tube manufacturer	Hitachi	varies (Toshiba tested)	Ikegami	Philips
CRT size (diagonal, inches)	21 in.	21 in.	19 in.	19 in.
Active screen (diagonal, inches)	18.75 in.	19.5 in.	17.75 in.	17.25 in.
Pixel dimensions (W x H)	1,152 x 870	1,152 x 882	1,024 x 768	1,024 x 768
Resolution (dots per inch)	72 dpi	74 dpi	72 dpi	72 dpi
Gray levels	2, 4, 16, 256	2, 16, 256	2, 4, 16, 256	2, 4, 16, 256
Vertical scan rate (hertz)	75 Hz	70.4 Hz	75.02 Hz	74.93 Hz
Horizontal scan rate (kilohertz)	70 kHz	64.8 kHz	60.241 kHz	60.241 kHz
Color-capable card	no	yes	yes	yes
Software				
Pan	no	no	yes	yes
Zoom	no	no	2x, 4x	2x
Virtual desktop (max)	no	no	8,192 x 768 pixels	4,000 x 1,500 pixels
Tear-off menus	no	yes	no	no
Pop-up menus	no	no	yes	no
Screen saver	no	yes	no	no
Enlarged menus	no	yes	no	no
Screen capture	no	yes	no	no
Other				
Glare treatment	silica coating	none	chemical etch	OCLI coating
Tilt/swivel stand	yes	yes	yes	yes
Brightness/contrast controls	front	front	side	front
Dimension (W x H x D, inches)	19.25 x 18.25 x 20	20 x 19.25 x 16.5	19.25 x 19 x 15.75	19 x 17.5 x 17
Weight (pounds)	55 lb	60 lb	57 lb	40 lb
Warranty	1 year	1 year	1 year	1 year
Manufacturer	CalComp, Inc. 2411 W. La Palma Ave. Anaheim, CA 92803 (800) 458-5888 (714) 821-2000	Radius, Inc. 1710 Fortune Drive San Jose, CA 95131 (800) 227-2795 (408) 434-1010	RasterOps 2500 Walsh Ave. Santa Clara, CA 95051 (800) 468-7600 (408) 562-4200	SuperMac Technology 485 Potrero Ave. Sunnyvale, CA 94086 (800) 624-8999, ext.210 (408) 245-2202

The Bottom Line

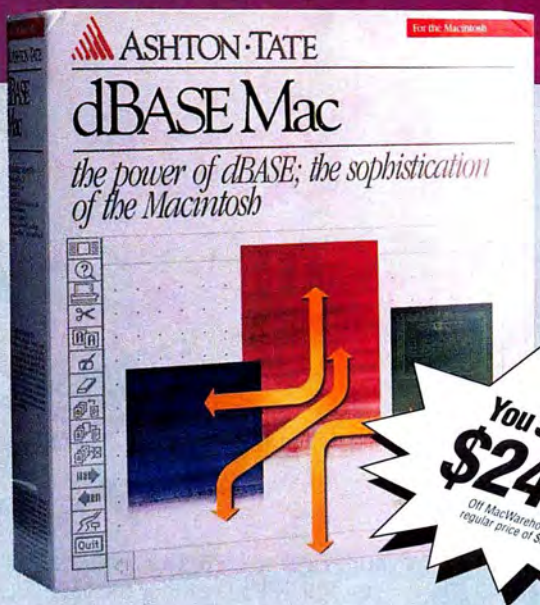
In our October 1989 lab report, SuperMac's 19" Gray Scale Monitor came in a close second to the PCPC Shadowgraph. Both used an Ikegami tube and performed admirably in every way, their only flaw being a slight flicker. PCPC has since dropped the price of the Shadowgraph and increased the vertical scan rate to eliminate the flicker (see the "On the Horizon" sidebar). The new **SuperMac 19" Platinum Display** ($2,399), on the other hand, switched to a Philips tube that has proved to be even better than the Ikegami. OCLI glare coating is standard, as are pan and zoom with a large virtual desktop. The SuperMac system is flawless and priced competitively.

The specifications of the **Radius Two Page Display/21** ($3,190) are nearly identical to those of the 19-inch Radius Gray Scale Display we reviewed last October. Although this CRT size is two inches larger, the pixel dimensions remain 1,152 x 882, yielding an almost-WYSIWYG 74 dpi. Also, the TPD/21 equaled or outperformed its 19-inch sibling in every benchmark test. If you can afford it, you won't be disappointed by this excellent display system.

The **RasterOps ClearVue/GS** ($2,195) makes good use of the aforementioned 19-inch Ikegami tube. If you can live with less-than-perfect linearity and geometry, consider the RasterOps as an alternative to the slightly more expensive SuperMac 19" Platinum Display. It has many of the same neat software features, plus pop-up menus. The ClearVue/GS is also one of the few gray-scale monitors that can be purchased with a card for use with a Mac SE/30.

The **CalComp DrawingCard GrayVision** ($3,195) is an undistinguished product. Although it performed below average in the MTF-sharpness, focus, and nuisance benchmark tests, it does have a few features worth noting: a paper-white, semiflat tube, and gamma correction. The CalComp display is overpriced, considering its spartan feature set.

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Inquiries: 1-908-367-0440
Fax: 1-908-905-9279
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BONUS OFFER!

To use dBASE Mac, you'll need a hard disk drive. Now's your chance to take advantage of these MacWAREHOUSE Sale prices!

Power User 20MB Hard Drive .....only $309!

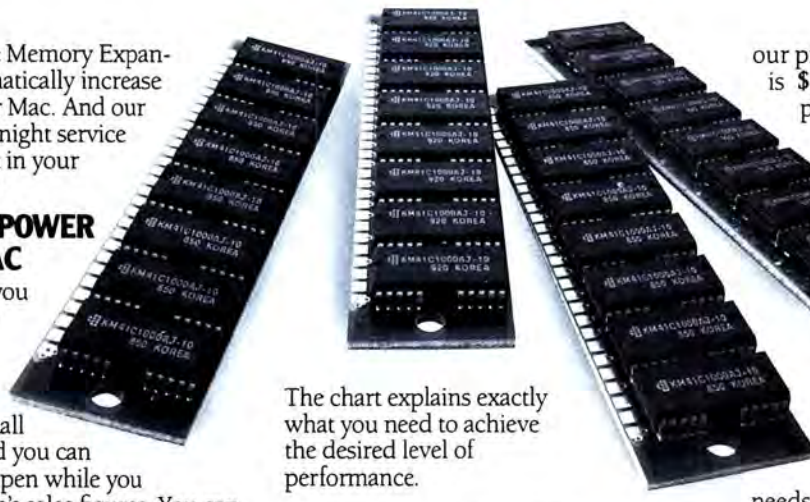
Power User 45MB Hard Drive .....only $399!

MUKØB

Tomorrow's Upgrade For Your Mac Is Only $69*

FREE! STEP-BY-STEP VIDEO INSTRUCTIONS

A MacWarehouse Memory Expansion Kit will dramatically increase the power of your Mac. And our fast, reliable, overnight service will have your Kit in your hands tomorrow!



MORE BRAIN POWER FOR YOUR MAC

Never again will you have to quit your word processor just to answer a question about a spread-sheet. Install extra memory and you can leave your letter open while you refer to last month's sales figures. You can edit those monstrous scanner files with advanced graphics applications or develop your own custom HyperCard stacks. More memory means more power at your fingertips.

PLUG IN INSTALLATION

Adding memory doesn't require technicians in lab coats. Just open your Mac, slide out the main circuit board and plug in your SIMMs. Our FREE video will give you STEP-BY-STEP installation instructions. Every type of Mac is covered and we think we've made it a breeze.



WHAT DO I NEED?

Our helpful sales and technical staff is standing by to answer any questions and take the mystery out of memory upgrades. Memory cards come with one megabyte on each card and are usually sold in pairs — (2@$69each).

The chart explains exactly what you need to achieve the desired level of performance.

To upgrade a 4-socket Mac Plus or SE to this amount of memory	Do this: (install in multiples of two only)
2 MB	Remove all four existing 256K SIMMs, install two 1M SIMMs, leave two sockets for future expansion.
2½ MB	Remove only two 256K SIMMs, install two 1M SIMMs.
4 MB	Replace all four 256K SIMMs with four 1M SIMMs.
To upgrade an 8-socket Mac II, IIx, IIcx, or SE30 to this amount of memory	**Do this: (install in multiples of four only)**
4 MB	Remove all four existing 256K SIMMs, install four 1M SIMMs, leave remaining sockets for future expansion.
5 MB	Keep existing 256K SIMMs, install four 1M SIMMs in remaining sockets.
8 MB	Remove all four 256K SIMMs install eight 1M SIMMs.

To open your Mac Plus or SE, you'll need a specially designed tool – it's available from us as part of a handy tool kit for just $9.

WHAT YOU NEED TO KNOW

Memory chips come factory-installed on plug-in cards, called SIMMS (Single In-line Memory Modules). Each one megabyte SIMM card holds eight top quality, memory chips. We carry chips by all the major manufacturers like Texas Instruments, Intel and Samsung. We also carry the full line of Dove memory products.

Prices can vary a lot, based on quality, speed and demand. At press time our price for 1MB, 120 ns SIMMS is $69. Please call for the very latest prices and availability. Our sales staff will tell you what you need and help make your choice an easy one.

SPEED

Do you need 80, 100 or 120 Nanosecond (ns) chips? Nanoseconds are billionths of a second, so an 80 ns chip responds faster than a 100 ns chip. The original Mac used relatively slow 150 ns memory chips. The 68020 processor needs 120 ns (or faster) chip, and the 68030 Macs like the speedier model.

OVERNIGHT DELIVERY

Place your order by 12:00 a.m.(E), weekdays and we'll deliver overnight for just $3.00. There's never been a better time to consider a memory upgrade. Call our toll-free number now and tomorrow morning your Mac will be off to a brand new start.

MacWAREHOUSE™

1-800-255-6227

Call toll-free
Twenty-four hours a day,
seven days a week.
Inquiries 1-908-367-0440
Fax 1-908-905-9279

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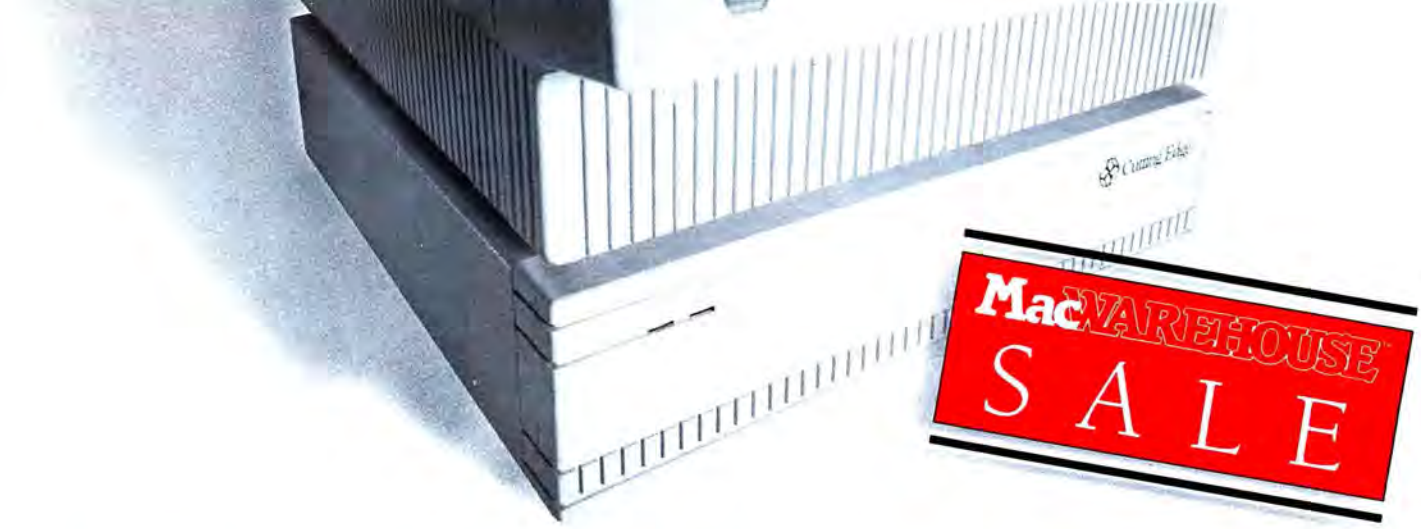
MACWAREHOUSE 30 DAY MONEY BACK GUARANTEE

If, for any reason, you are dissatisfied with your MacWarehouse Memory Kit, you may return it for a full refund within thirty days of purchase. All you have to do is call us for a return authorization number and return the product, postage paid, in its original condition, with the original packaging and documentation.

ONE YEAR WARRANTY. MacWarehouse also guarantees its Memory Kits against manufacturer defects for one year from the date of purchase. We will repair the item or replace it at our discretion.

MUKØP

* SIMMs prices vary. Call for latest information.
** Limited Offer! Free video with purchase of 2 or more SIMMs.



If You Can Find A Better Deal In Hard Drives . . .

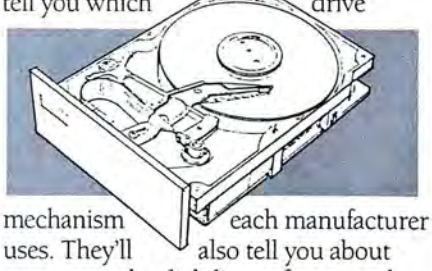
Between now and **September** 30th. MacWarehouse is offering savings on every hard drive we sell. So, if you're thinking of buying a new hard drive, your timing couldn't be better. Check out our sale prices and your savings, compared to our December 1989 prices, in the chart.

We offer drives by leading manufacturers like Cutting Edge, C.M.S., Quantum, Power User, PLI Infinity Turbo and others — all at unheard of low prices.

	20+ MB		30+ MB		40+ MB		60+ MB		80+ MB		***40+ Removable	
	SALE PRICE	YOU SAVE	SALE PRICE	YOU SAVE	SALE PRICE	YOU SAVE	SALE PRICE	YOU SAVE	SALE PRICE	YOU SAVE	SALE PRICE	YOU SAVE
Cutting Edge	309	$100	379	$120	435	$114	469	$160	529	$210	699	$200
CMS, MacStack	429	$100	499	$46	589	$36	649	$50	769	$30	839	$36
Power User	309	NEW	359	NEW	399	NEW	459	NEW	499	NEW	679	NEW
PLI, Infinity Turbo	–	–	569	$20	619	**$26	–	–	–	–	999	$120
*Quantum Internal	–	–	–	–	399	$126	–	–	649	$220	–	–

Savings are calculated from MacWarehouse December 1989 published prices. *Quantum drives are for internal installation and require a 3.5 Internal Drive Kit for $75 **PLI is a 50meg turbo drive. ***40+ meg Removable Cartridge Drives come with 1 cartridge. Additional cartridges available.

Let our helpful sales staff take the hassle out of buying a drive. They'll tell you which drive



mechanism each manufacturer uses. They'll also tell you about access speed, reliability, software and the manufacturer's warranty.

MONEY BACK GUARANTEE

They'll tell you which drives come with the MacWarehouse 30-day money back guarantee. Try one at home. And if, for any reason, you're not 100% satisfied, just return it to us within thirty days and we'll refund your money.

Then there's the MacWarehouse Loaner Drive Program. Buy from MacWarehouse and if you ever have a problem, you won't be without a drive for more than a few hours.

READY TO USE

A hard drive from MacWarehouse couldn't be easier to use. We'll tell you which ones come pre-formatted — ready to use right out of the box. You just plug in, turn on your Mac and go!

If you do need any help, the MacWarehouse Technical Support staff is standing by our toll-free lines to assist you.

LIMITED TIME OFFER

MacWarehouse sale prices, based on capacity, are shown in the chart. Also shown are the savings from pre-holiday prices. (This is a limited time offer, valid through **September** 30, 1990.) Overnight delivery is just $3, anywhere in the Continental United States.

So call us now and tomorrow morning you'll be up and running with the best hard drive deal in the business!

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MacWarehouse 30-Day Money Back Guarantee

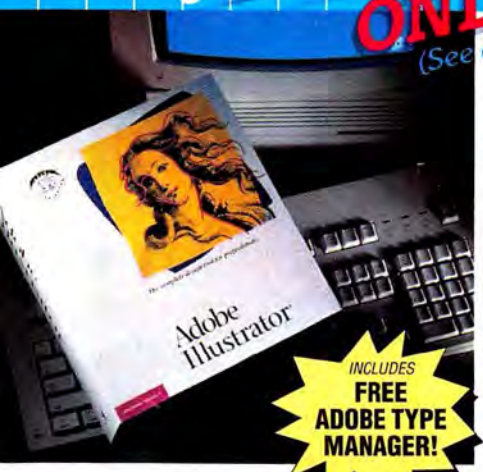
Many of our drives come with the MacWarehouse 30-Day Money Back Guarantee. If, for any reason, you're not completely satisfied, call us within thirty days of receipt for a return authorization number and full refund of the purchase price.

MUKØD

OVERNIGHT DELIVERY
ONLY $3.00
(See details below)

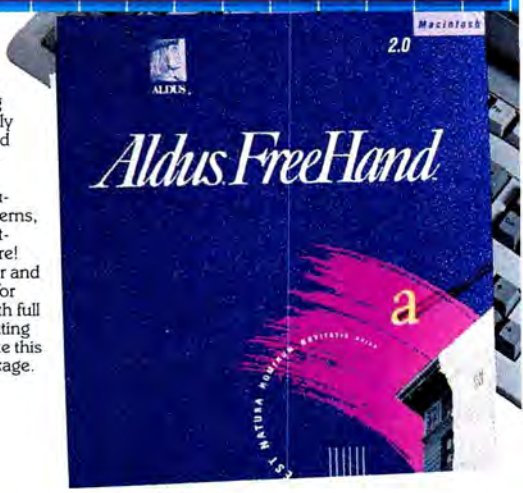
GUARANTEE

Many of our products come with a thirty day money back guarantee, if you are not completely satisfied. Ask for details when you place your order.



Adobe Illustrator 3.0 (Adobe Systems, Inc.)
The page creation and layout solution! Features include technical illustration, freehand sketching, automatic scanned image tracing, blending tools and more. New text-handling tool allows direct, on-screen entering and manipulation of text. Use it to choose any number or style of typefaces in a single text block and gain complete character control. The new graphics tool lets you automatically create, manipulate and customize presentation quality charts and other graphics. Includes FREE copy of Adobe Type Manager. (desktop publishing). **$349.**

FreeHand 2.0 (Aldus)
The Graphics companion to PageMaker. Freehand 2.0 delivers the power of the best drawing software and works directly in PostScript to give printed artwork a clean, sharp appearance. New features include a blending tool, autotrace, customizable patterns, TIFF support, PICT to PostScript conversion and more! FreeHand displays in color and can produce separations for spot and process color with full PMS support. Flexible editing and text handling complete this outstanding graphics package. (graphics). **$329.**



ACCESSORIES

Abcom (full line available)
Dust Covers ..... starting at 10.
American Power Conversion
110 SE UPS ..... 219.
370 ci UPS ..... 349.
Apple
Toner Cartridge - Laser Printer II ..... 105.
Basic Needs, Inc.
HardTops Keyboard Covers ..... 15.
Keyboard Flip ..... 6.
Dust Covers - Grey Nylon Ripstop
Mac II and extd. keyboard ..... 12.
Mac IIcx/ci Monitor Stand ..... 40.
Universal Laser Printer Stand ..... 28.
Utility Pac ..... 11.
Computer Giftware
Mouse Pads ..... starting at 12.
Curtis
Command Center ..... 89.
Computer Tool Kit (52 pc.) ..... 49.
Ergotron
MacTilt-SE ..... 68.
MacTilt II-RGB ..... 75.
I/O Design
Imageware II Carrying Case ..... 49.
Macinware IIcx Carrying Case ..... 85.
Macinware Mac II Carrying Case ..... 99.
Macinware Plus Carrying Case ..... 64.
Macinware SE Carrying Case ..... 75.
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The Ultimate SE Carrying Case ..... 79.
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B.A.S.F. made in U.S.A
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DS/High Density (1.44 Meg) ..... 24.
Sony
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DS/HD (1.44 mb) ..... 24.

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Managers or Sales & Marketing .. ea. 39.
Healthcare or Finance & Banking ea. 39.
Education or Arts & Leisure ..... ea. 39.
Comp. Sciences & Engineering ..... 39.
AEC Management Systems
FastTrack Schedule 1.5 ..... 139.
Aldus
Persuasion 2.0 ..... 329.
Avery Label
MacLabel Pro ..... 49.



Mouse Pads (Computer Giftware)
For sophistication during hours-and excitement after! **Executive Pads** put the elegance of marble on your desk. Choose from White Italian Marble, Green Marble, Granite, and even Kentucky Burlwood. **$12.** After the grind why not invite a Bikini-clad California Girl or Volley Ball Hunk over to your **Bachelor or Bachelorette Pad? $15.** The truly daring may even opt for an exciting **Indiana Jones** adventure. **$13.** MacWarehouse is now your exclusive mail order source for new **Mickey Mouse** & **Dick Tracy** mouse pads! **$13.** (accessories)

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Payroll 3.5 ..... 109.
Absolute Solution
Computerized Classic Accounting .. 225.



Macintosh SE/Plus w/Extended Keyboard Carrying Case (Targus)
Pamper your Mac with a Targus case made of Zilicone treated nylon to give you waterproof durability and an impact absorbing high-density foam layer with a soft protective lining for complete protection. Cushioned shoulder pad and handles provide extra comfort and convenience. Plus there's room for everything from your Mac, a hard disk drive, and the extended keyboard to pockets for your mouse, floppies, cables, and pens. (accessories) **$69. Full line available.**

Casino Master (Centron)
Let it Ride! You can bet on having hours of fun with Casino Master's five exciting casino games. Includes **Blackjack Ace, Crapsmaster, Roulette Master, Pokermaster** and **Baccarat Master**. Exact table simulation, mouse controlled betting, selectable bankroll, stored win/lose statistics and complete manual included. Mac II version available in full color! An odds-on favorite with professional gamblers. Individual games **$27ea.** 5 game Casino Master Package **$49.** / Deluxe Mac II version **$55.**

NEW!
Black Jack Strategy Tester
Test your betting and playing strategies over thousands of hands. Card counting, 1-8 decks, 1-7 players. Develop a winning strategy, practice it with Casino Master or Blackjack Ace, then go off to the casino with confidence! (entertainment) **$65.**



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FREE! The POWER USER'S TOOL KIT 4.0



NEW! Includes: Disinfectant 2.0, Public Folder and SmartKeys!

Version 4.0, the very latest edition of Steven Bobker's Power User's Tool Kit is available now. Eight great programs on one handy disk. There's Tidy-It-Up! - a great utility to tidy your System Folder and Disk Doubler Expand - to extend all those compressed files.

- Disinfectant 2.0 - Major new version. Many new features, including a new protection INIT.
- Tidy It Up-Great utility for organizing your system folder.
- Public Folder-Allows you to transfer files across AppleTalk.
- Disk Doubler Expand-Uncompresses DD, Stuffit and PackIt Files.
- And much more!

MacWAREHOUSE™ 1-800-255-6227

The POWER USER'S TOOL KIT 4.0 is FREE from MacWAREHOUSE when you order from us. If you want the disk, you pay only $1.50 for shipping and handling. The programs are shareware, so you can try them free of charge. If you wish to continue using them, some authors ask that you pay a fee ($10-$35). Many are absolutely free. All of the details are explained on the disk, which is yours to keep.



FREE CATALOG!
We carry more than 1200 Macintosh products, including all the latest releases and new versions. We pride ourselves on getting new products first. If you can't find what you need, just fill in the information requested below and we'll start your free, one-year subscription to the MacWAREHOUSE catalog.



Timbuktu/Remote 2.0 (Farallon)
Timbuktu/Remote 2.0 enables you to remotely connect your Mac to another Mac to control, observe, send or exchange files over telephone lines or ISDN links. Observe the remote Mac's screen in a window on your desktop. Additional security features include a unique privilege password protection scheme and security call-back. Timbuktu/Remote 2.0 now supports CCL modem control language for users with non-Hayes compatible modems. (networking). **$123.**



Freedom of Press 3.0 (Custom Applications, Inc.)
Feel free to take new PostScript printing liberties with updated Freedom of Press. Freedom of Press lifts the costly restriction of requiring a PostScript printer to print PostScript-language files. Now, in addition to the 40 non-PostScript printers currently supported, Freedom of Press can print PostScript of the Apple line of Quickdraw printers. It includes 35 scalable fonts and supports any additional PostScript font including Type 1 fonts from Adobe. Now compatible with all Mac systems. (utilities) **$255.**

PixelPaint Professional 1.0 (SuperMac)
The first "true-color" advanced graphics program that is designed to grow with you-from 8-bit to 32-bit systems and from general painting to advanced design. PixelPaint Pro gives you the intuitive tools to do your work easily. Use powerful features like advanced masking, fill effects, dithering, anti-aliasing and transparency control for advanced graphics effects and photographic-quality images. New 2.0 version coming soon!! Buy 1.0, register and recieve a free upgrade. (graphics). **$389.**



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FROM MacWAREHOUSE™



FontShare 2.0
FontShare allows up to 32 network users to access downloadable PostScript printer fonts without having to store them locally. It works with AppleShare and TOPS, includes Net Counter utility and is ATM compatible. **$149.**



Mac IIcx/ci Monitor Stand
Mac IIcx Monitor Stand, from Basic Needs, saves desktop space while protecting the IIcx from the weight of a heavy monitor. Your IIcx or ci fits right underneath the stand and the 16 gauge steel frame provides solid support for any size monitor. Platinum. **$40.**



MacPrint 1.2
MacPrint displays your printer's fonts for true WYSIWYG performance and prints text & graphics at maximum resolution. Completely transparent in operation. **FREE** copy of MacEnvelope 4.0 with each purchase of MacPrint. Limited Supply. **$95.**



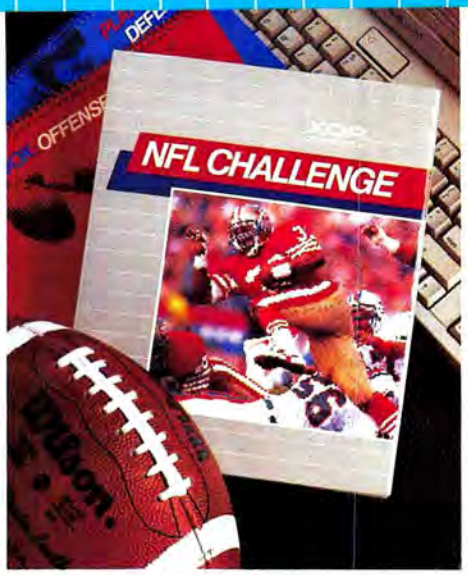
MaxFax Modem
An incredible package deal! A 2400 bps full featured modem & 9600 bps send and receive fax! Add a dynamic software duo (MAcKNOWLEDGE and MaxFax) and a cable for the most convenient, easy to use and competitively priced fax/modem on the market. **EXCLUSIVE GRAY SCALE SUPPORT! $309.**

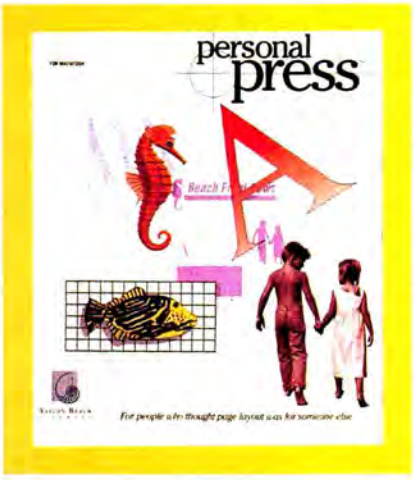
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Adobe Systems, Inc.
Adobe Illustrator 3.0 ..... 349.
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Aldus
PageMaker 4.0 ..... 499.
PrePrint ..... 329.

NFL Challenge (XOR Corporation)
Its time for NFL challenge-the "Superbowl" of football simulations! NFL challenge is the most realistic NFL football simulation in any arena. It's also the only one officially recognized and licensed by the NFL. The game uses actual stats from the latest NFL season and offers over 60 offensive and defensive plays. Test your strategy against the computer or battle it out in head to head competition with a friend. (entertainment) **$55.**





Personal Press (Silicon Beach)
Personal Press creates professional layouts for you. Forget the long, steep learning curve, because Personal Press has AutoCreate to assemble stories and graphics into templates. It includes a full-featured word processor with spelling checker and thesaurus, controls for scanned images, spot color separations, posted notes, link navigator, extensive page previewing, and on-line help. (desktop publishing) **$199.**

Data Translation
PhotoMac ..... 609.
OLDUVAI
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MacStack 44 Meg Removable ..... 839.
Cutting Edge
800K External Floppy Drive ..... 149.
SyQuest Removable 44 Meg ..... 699.
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Under the Mac 45+ Meg ..... 435.
Under the Mac 60+ Meg ..... 469.
Under the Mac 80+ Meg ..... 529.
Dayna Communications
Dayna File Single 360K (5 1/4") ..... 525.
Dayna File Dual 360K & 1.44M ..... 749.
Fujitsu
800K Floppy Drive ..... 149.
Kennect Technology
Drive 2.4 ..... 329.
Drive 360 ..... 265.
Drive 1200 ..... 265.
Rapport ..... 199.
Orange Micro
Grapplers ..... Call
Mac 286 Co-Processor ..... 1079.

Peripheral Land, Inc.
Infinity Dual 40 Meg Turbo ..... 1875.
Infinity Turbo 40 Meg ..... 998.
Turbo Floppy 1.4 ..... 359.
Power User
20 Meg Drive ..... 309.
30 Meg Drive ..... 359.
45 Meg Drive ..... 399.
60 Meg Drive ..... 459.
80 Meg Drive ..... 499.
44 Meg Removable Drive ..... 679.
Quantum
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Quantum 80 MB Raw Drive ..... 649.
RasterOps
RasterOps Colorboard 264 ..... 699.

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Clip Art CD-ROM ..... 29.
Lingua-ROM ..... 279.
Fair Tide Technologies
Navigate! mono. ..... 199.
Learning Company
Math Rabbit or Reader Rabbit 2.0. ea.30.
Nordic Software (full line available)
MacKids Preschool Pack ..... 35.
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VocabuLearn French, Spanish, German, Italian, Russian, or Hebrew ..... ea. 35.
VocabuLearn Japanese ..... 35.
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Where in Time is Carmen Sandiego? 29.
Bullseye
Ferrari Grand Prix or P51 ..... ea 31.
Centron Software, Inc.
BlackJack or CrapsMaster ..... ea 27.

The Neon Ultimate Carrying Case (I/O Design)
Here's the latest in fashionable outerware for the active Macintosh. It's the *NEW* "Neon Ultimate" SE in fluorescent green, hot pink and brilliant yellow *neon* accents! Pamper and protect your Plus or SE with its high density foam padding & durable DuPont Cordura nylon exterior. Secure all your peripherals in its roomy padded inner compartments & two exterior pockets. **FREE** matching disk wallet with every purchase while supplies last. (accessories) **$89.**



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Virex (Microcom)
Immunize your Mac against deadly computer viruses! Just give the command and Virex with The Virex INIT is on duty monitoring your Mac to prevent infection from all known Mac viruses. Use Virex's Record/Scan feature to identify previously unknown viruses. Once diagnosed, order Virex to operate and repair files like a skilled surgeon. Rapid upgrades stop new virus strains in their tracks. Registered users receive update notices and have access to publisher's Toll-free Virex Help Hotline. (security) **$59.** 10-pack **$349.**

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Vertical Solutions
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MacDraft 2.0 ..... 195.
Strata
StrataVision 3D ..... 375.

COMMUNICATIONS & NETWORKING

CE Software
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QuickMail 2.2 (1-10 Users) ..... 315.

MacLabelPro (Avery)
Avery labels just got "Mac Easy." Now you can transform your Mac into a "Label Publisher." MacLabelPro ends formatting struggles, merges existing lists with Avery Label layouts, provides DTP capabilities and more! Features include: Preset layouts for Avery Dot Matrix Labels and Laser Printer Labels; Drawing tools and a library of clip art; ability to rotate and fill patterns; serialization for sequentially numbered labels; easy mail merge and graphic importing. (business) **$49.**



CompuServe
CompuServe Navigator 3.0 ..... 49.
CompuServe Subscription Kit ..... 23.
DataVIZ
MacLink Plus w/PC 4.5 ..... 119.
MacLink Plus/Translators ..... 99.
Dove
FastNet SCSI ..... 749.
FastNet III, SE or SE/30 ..... ea. 375.
Dow Jones
News/Retrieval Membership ..... 24.
Farallon
MediaTracks ..... 189.
PhoneNET Plus, SE & II ..... 33.
PhoneNET Manager's Pack ..... Call
PhoneNET Star Controller ..... 825.
Timbuktu 3.1 ..... 95.
Timbuktu Remote 2.0 ..... 123.
FreeSoft
White Knight 11.01 ..... 85.
Infosphere
Liaison ..... 175.
InSignia Solutions
Soft PC 1.3 (Mac II) ..... 245.
Microcom Software
Carbon Copy Mac ..... 117.
Prodigy
Mac Starter Kit ..... 27.
Prometheus
MAcKNOWLEDGE ..... 85.
Shiva
DOS Dial-In or CONNECT ..... ea. 69.
NetModem V.32 (9600) ..... 1499.
Software Ventures
Microphone II v.3.0 ..... 215.
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FaxGate Plus 1.1 ..... 239.
MailMaker (5-Pack) ..... 117.
TOPS
FlashCard ..... 155.
TOPS 3.0 Network Bundle ..... 187.
TOPS 3.0 DOS Network Bundle ..... 165.
Traveling Software
Lap-Link III Connectivity Pac ..... 119.
Lap-Link III Network Pac ..... 185.

DATABASE SOFTWARE

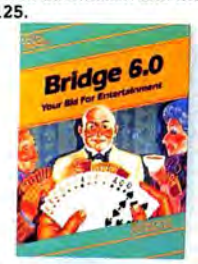
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Omnis 5 ..... 519.
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Odesta
Double Helix 3.0 ..... 389.
ProVUE
Panorama 1.5 ..... 249.

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Casady & Greene
QuickDEX ..... 31.
Dubl-Click
Calculator Construction Set v. 2.0 ..... 45.
JAM Software
Smart Alarms & Appt. Diary ..... 64.
Smart Alarms (1 - 4 users) ..... 125.
Smart Alarms (5 - 8 users) ..... 189.
Smart Alarms (9 - 15 users) ..... 249.
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Spectrum Holobyte
Tetris ..... 22.
Welltris ..... 19.

The Software Toolworks
ChessMaster or Life & Death ..... ea. 32.
Cribbage & Gin King ..... 39.
The Hunt for Red October ..... 20.

Three Sixty
Sands of Fire ..... 32.

Toyogo's Nemesis
Go Master ..... 49.
Joseki Genius ..... 30.
Deluxe ..... 99.

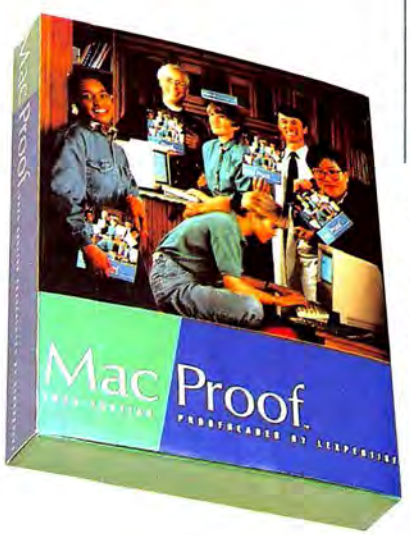
Visionary Software
Synchonicity ..... 39.

XOR
Lunar Rescue or MacGolf 2.0 ..... 34.
MacGolf Classic ..... 52.
Road Racer ..... 39.
NFL Challenge ..... 55.

FONTS

Adobe (Full line available)
Adobe Type Manager 2.0 ..... 55.
Adobe Type Reunion ..... 39.
Plus Pack ..... 109.
TypeAlign ..... 59.
Type Set 1 or Type Set 2 ..... ea. 58.

Altsys
Fontastic Plus 2.02 ..... 51.
Fontographer 3.01 ..... 249.
Metamorphosis ..... 149.
The Art Importer 2.0 ..... 89.



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Dubl-Click
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Letraset
LetraStudio ..... 275.
LetraFonts (various) ..... ea. 69.

Tactic Software
ArtFonts ..... 50.

Deneba
Canvas 2.1 ..... 189.
Ultra Paint ..... 125.

Digital Vision
Computer Eyes B&W ..... 199.
Computer Eyes Pro Color ..... 349.

Dream Maker
Cliptures, Vol. 1, 2, 3 ..... ea.69.
MacGallery ..... 27.

Electronic Arts
Studio/1 ..... 96.
Studio/8 ..... 295.

Farallon
MediaTracks ..... 189.

Innovative Data Design
Dreams 1.1 ..... 319.

MacroMind
MacroMind Director ..... 439.

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Business 1 or Accents & Brdrs 1 .. ea.65.

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Photoshop ..... 499.
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Streamline ..... 225.

Aldus
Freehand 2.0 ..... 329.

Aperture Technology
Aperture Visual Information Mgr. ..... 599.

Bright Star Technology
HyperAnimator 1.5.1 ..... 98.
interFACE ..... 249.

Broderbund
TypeStyler 1.01 ..... 119.

Claris
MacDraw II ..... 289.
MacPaint 2.0 ..... 92.

Educorp
Sports-ROM ..... 35.

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MicroFrontier
Enhance 235

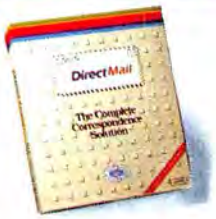
Multi Ad Services
Multi-Ad Creator ..... 865.

Paracomp
DrawTools ..... 62.
Swivel 3D 1.1 ..... 325.

Silicon Beach
Digital Darkroom ..... 248.
Super 3D ..... 315.
SuperPaint 2.0 ..... 135.

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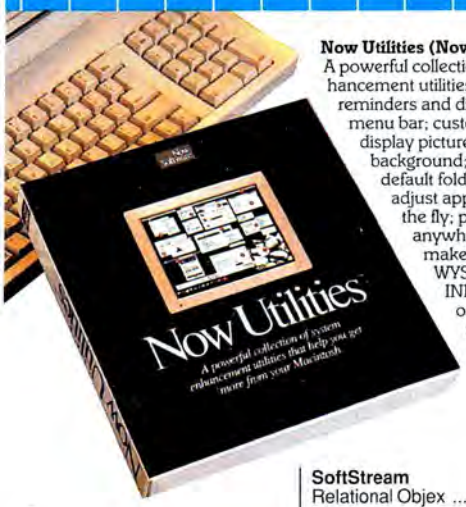
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SoftStream
Relational Objex ..... 149.
Somak
LaserArt CD-ROM #1 or #2 ..... ea. 59.
Sharpen Up ..... 59.
Strata
StrataVISION 3d ..... 375.
Strategic Mapping, Inc.
Atlas Map Maker 4.5 ..... 375.
Studiotronics
Colorset 1.5 ..... 229.
SuperMac
PixelPaint 2.0 ..... 225.
PixelPaint Professional ..... 389.

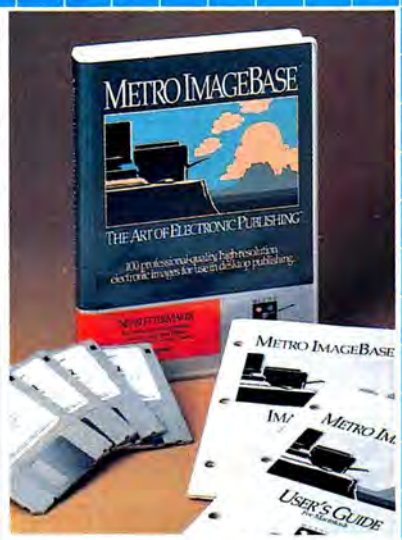
Microtek
Microtek MSF-300GS Scanner ..... 1589.
Microtek MSF-300Z Scanner ..... 1998.
NEC
Intersect CDR-35 ..... 419.
Qume
Crystal Print Publisher ..... 2900.
Seikosha America
Seikosha Printer (dot-matrix) ..... 235.
Sharp (full line available)
The Wizard ..... 229.
ThunderWare
LightningScan 400 ..... 385.
ThunderScan Plus ..... 199.

HYPERWARE

Bantam
Complete HyperCard Handbook ..... 22.
Beacon Technologies
HyperBible International Version ..... 175.
HyperBible King James Version ..... 145.
DataDesk International
HyperDialer ..... 29.
MicroMaps
HyperAtlas ..... 59.
Silicon Beach
SuperCard 1.5 ..... 189.
Softstream International
HyperHit 2.2 ..... 125.
Symmetry
HyperDA 1.2 ..... 45.

INPUT/OUTPUT

Calcomp
WIZ Tablet ..... 159.
WIZ Pen ..... 57.
WIZ Templates ..... Call.



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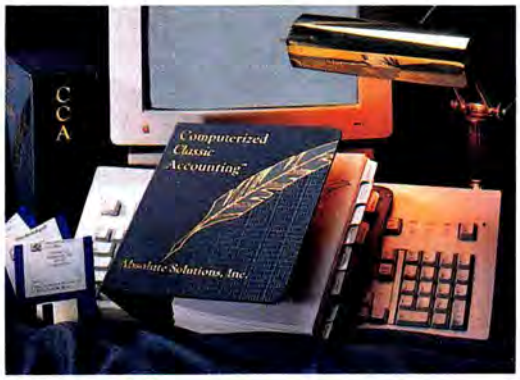
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LANGUAGES

Digitalk, Inc.
Smalltalk/V MAC ..... 125.
Microsoft.
QuickBasic ..... 64.
Shana Corporation
Inside Out ..... 369.
Symantec
THINK'S C 4.0 or Pascal ..... ea. 165.
Zedcor
ZBasic 5.0 ..... 88.

Tactic Software
Art Clips Vol. 1 or Vol. 2 ..... Call.
T/Maker
Click Art Business Images ..... 32.
EPS Illustrations ..... 85.
Business Cartoons ..... 33.
Zedcor
DeskPaint & DeskDraw ..... 115.

HARDWARE & PERIPHERALS

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DigiVideo B&W ..... 399.
DigiVideo Color ..... 699.
Co Star
Label Writer ..... 185.
Cutting Edge
19" Two Page Monitor 959
Hewlett Packard
HP DeskWriter 2278A ..... 859.
LogiTech
ScanMan ..... 319.
MegaGraphics Display Systems
Rival 2001 System for Mac II ..... 1275.
Rival 3001 System for Mac SE/30 . 1275.
Rival SE System for Mac SE ..... 1275.
Rival Plus System for Mac Plus ..... 1310.
19" Color 2008 Hi-Res/Mac II ..... 4460.
16" Color 2008 Hi-Res/Mac II ..... 3525.
Grayscale 2008/Mac II ..... 2210.
Grayscale 3008/Mac SE/30 ..... 2399.

CH Products
Mach IV Plus Mouse/Joystick ..... 51.
Mirage Adaptor ..... 35.
Roller Mouse ADB ..... 75.
DataDesk Intl.
DataDesk Switchboard ..... 175.
Mac 101 Keyboards ..... 129.
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LYNX
QuadLYNX Trackball ..... 59.
MicroSpeed
MacTrac ADB ..... **NEW** 75.
Micro Touch
The UnMouse ..... 189.
Mouse Systems
A+ Mouse (SE/II) or (512, Plus) ... ea. 58.
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MacSnap 524S ..... 239.
MacSnap 548S ..... 499.

MODEMS/FAX

Abaton
InterFax12/48 ..... 265.
InterFax 24/96 ..... 419.
Best Data Products
SmartOne 2400/1200 ..... 139.
Dove
DoveFax desktop ..... 279.
DoveFax Networkable desktop ..... 375.
DoveFax Nubus ..... 449.
Networkable Nubus ..... 749.
Hayes
Smartmodem 2400 ..... 349.
Smartmodem 9600 (V series) ..... 759.
Power User™
2400 baud modem ..... 99.
24/96 Mini Send Fax ..... 149.
Prometheus
MaxFax ..... 309.
2400 Mini Fax ..... 209.
ProModem 2400 SE Int. ..... 209.
ProModem 2400M ..... 199.
ProModem 2400M II ..... 205.
Travel Modem ..... 205.
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Supra Modem 2400 ..... 129.
U.S. Robotics
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Coda
MacDrums ..... 31.
Perceive ..... 49.
Electronic Arts
Deluxe Music Construction 2.5 ..... 85.
Deluxe Recorder ..... 99.
Farallon Computing
MacRecorder 2.0 (records sound) ... 159.
Passport Designs
NoteWriter II 2.3 ..... 325.
Passport MIDI Interface ..... 89.
Primera Software
Different Drummer ..... 59.
Repertoire
Music Publisher ..... 359.
Resonate
Listen 2.0 ..... 62.
Tactic Software
Sound Clips Vol. 1 ,2,3,or 4 ..... ea. 49.

SECURITY & VIRUS PROTECTION

ASD Software, Inc.
FileGuard 2.5 ..... 145.
FileGuard Office 5-pack ..... 435.
FileGuard Office 10-pack ..... 685.

Fifth Generation
Disk Lock ..... 118.
Microcom
Virex ..... 59.
Virex 10-pack ..... 349.
Kent Marsh
MacSafe II ..... 107.
NightWatch ..... 86.
QuickLock ..... 34.
Mainstay
AntiToxin ..... 59.
Symantec Corporation
S. A. M. ..... 67.

SPELLING/DICTIONARY THESAURUS CHECKERS

Deneba Software
BigThesaurus ..... 64.
Spelling Coach Pro 3.1 ..... 124.
Electronic Arts
Thunder II ..... 49.
Lexpertise
MacProof 3.2.1 ..... 115.
LifeTree
Correct Grammar ..... 49.
Microlytics
Word Finder 2.0 ..... 34.
Sensible Software
BookEnds or Sensible Grammar ..... 51.

STATISTICAL ANALYSIS

Abacus Concepts
StatView II ..... 279.
StatView SE+Graphics ..... 179.
SuperANOVA ..... 309.
Wolfram Research
Mathematica (SE) ..... 450.

UTILITIES

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Chesire 1.0 ..... 63.
Aladdin Systems Inc.
Programmer's Assistants ..... 57.
Shortcut ..... 46.
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CE Software
DiskTop 4.0 ..... 63.
Caere
OmniPage 2.1 ..... 539.
Central Point Software
Copy II Mac ..... 23.
Mac Tools Deluxe ..... 75.
Custom Applications
Freedom of Press 3.0 ..... 255.
Software Innovations
HandOff II ..... 52.
SuperMac
DiskFit 1.5 ..... 58.
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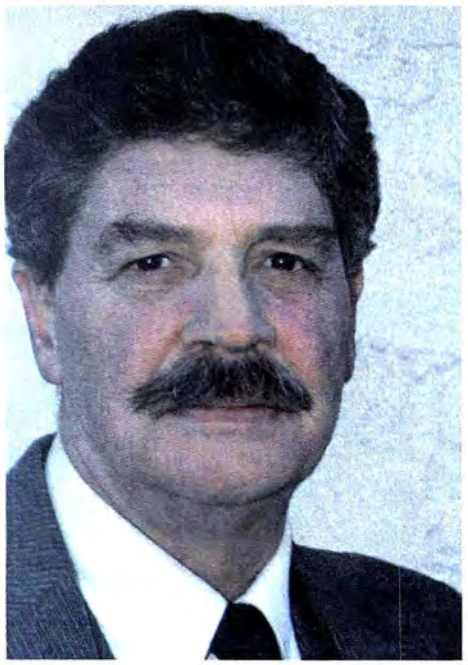


WHAT A Color-Retouching PROGRAM CAN DO FOR YOU

BY KEN MILBURN

Figure 1: Before and After





Three new color image-retouching applications can put professional darkroom techniques at your fingertips.

Every picture tells a story. If you don't like the way the story's told, true-color image-processing software can help you retell it. Despite the introduction of myriad new technical features, these packages can benefit anyone who uses a Mac to publish, make presentations, or do animation or graphic design. The upgraded PhotoMac 1.5 from Data Translation, Adobe Photoshop (see review, July '90, page 53), and Letraset's ColorStudio extend both the functionality and the ease of bit-mapped-image processing, whether the image is a scanned photo, a captured video frame, or an electronic painting.

You can use these programs to make a photo look its best or to create fantastic — yet realistic — montages involving hundreds of separate pictures.

PhotoMac, Photoshop, and ColorStudio have the same raison d'être, but they differ in price, user interface, features, and flexibility.

To give you a better idea of how these three programs work, I show how each one handles the major functions of color image-processing software and point out the differences in how they deal with often-used techniques.





Figure 1: The original portrait (far left), the image after color-balancing and retouching (left), the original office shot (above), and the composite image (right)

What a Color-Retouching Program Can Do for You



I tested the three programs' capabilities by tackling a common problem in newsletter, brochure, and small-magazine publishing: getting a color photo of a particular subject when working under a tight deadline. This is a situation in which a color image-retouching application comes into its own. It gives you many tools that let you manipulate what you have into the image you want.

The objective of my tests was to produce a color photo of a company CEO in a couple of hours. I started by searching the files for any photographs of him. I found only one in color — a head-and-shoulders snapshot, which was inappropriate; it would've been better if he had been sitting in his office or behind a desk. My next search revealed a color photograph of another man seated behind a desk. It wasn't a perfect photograph, but it was near enough to the ideal setting. ColorStudio, PhotoMac, and Photoshop let you combine elements of two photographs to produce the picture you need. I used all three programs to test the capabilities, interface, and features of each.

First I scanned both photos (see the scanners lab report, September '90, page 132). Once the images were onscreen, it was easy to see that they each had several problems. Since they were shot under different lighting, their contrast and color balance didn't match. The CEO's picture was a close-up snapped outdoors in late-afternoon light; the other was shot in the greenish glow of office fluorescent lighting. The photos were different sizes and needed to be scaled to matching proportions. The snapshot of the CEO was dirty and wrinkled, and the skin flaws were too obvious. The wall decorations and other paraphernalia behind the seated man were focused somewhat more sharply than he was, drawing attention away from him.

To retouch the photographs' flaws and to manipulate the images, I needed to use four basic photo-retouching techniques: darkroom procedures, retouching, pictorial effects, and image compositing.

Darkroom procedures include adjusting the color balance and setting brightness and contrast, which are

Figure 2: Darkroom Techniques



Figure 2a: ColorStudio integrates brightness, contrast, and color correction into a single dialog box. You can also drag high, middle, and low ranges for each color with the cursor, or you can draw an arbitrary line with the pencil. The line you draw is interpreted as the controlling gamma curve.

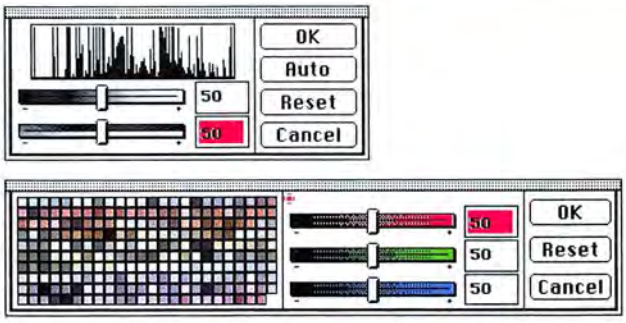


Figure 2b: PhotoMac has the simplest interface for color and gamma controls. Click on the Toolbox icon to access a slider-bar control for each. PhotoMac has no arbitrary color-correction mapping, and you can't separately control low, middle, and high tonal, or gamma, ranges.

also referred to as gamma controls. Retouching involves adding detail, controlling sharpness, and eliminating blemishes. Pictorial effects allow you to alter an image's style — you can make a photo look like a pointillist painting, for example, or make it partially negative. Image compositing is creating a new picture from two or more existing images.

Darkroom Procedures

Image-processing programs are known as electronic darkrooms because they mimic — indeed extend — the controls used in traditional photographic printmaking, such as those that balance colors, highlights, and shadows.

The first step in combining the pictures is to match their overall color balance by adjusting the red, green, and blue values of each picture so that the two correspond to each other. It is also necessary to match the two pictures' brightness; contrast; and tonal range, or gamma curve.

Adjusting the color balance, contrast, and brightness with an image-processing program is enough to

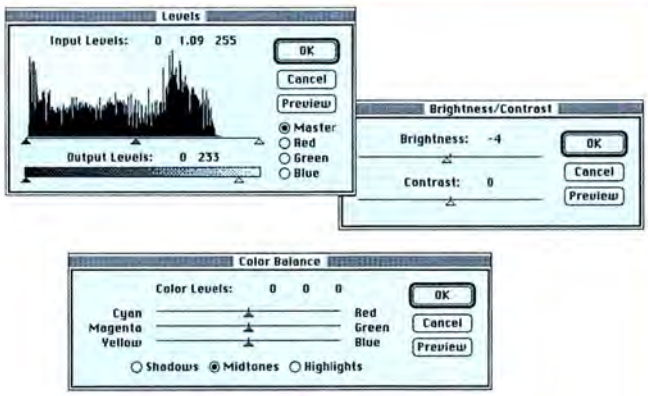


Figure 2c: Photoshop provides separate slide-control dialog boxes for adjusting color balance. When brightness and contrast are adjusted, all colors are affected simultaneously but only in highlights, middle tones, or shadows. To affect overall balance, you can use the Levels dialog box or a graphically manipulated gamma curve similar to ColorStudio's.

Selecting and Masking

Often the elements you want to alter in an image are irregularly shaped and have vague edges, so hand-tracing with the lasso tool can be painstaking and subject to errors. When buying an image-retouching program, you need to consider its flexibility in isolating areas of images. Not only does flexibility allow you to get a more professional finish, but accurate area selection makes spot color easier to apply.

ColorStudio, PhotoMac, and Photoshop all have auto-select tools that let you precisely select hard-to-trace shapes simply by clicking on them. You can determine how much of a selection the tool affects by setting a range of tones and then clicking within that selection. Any contiguous pixels with tonal values that fall within the designated range are automatically selected.

The three programs differ, however, in the flexibility and ease with which you can set auto-select options. You can set PhotoMac's options by dragging the Autoselect tool across as many tones as you want to include — easy to do, but you also tend to pick up tones you don't want.

In Photoshop, you type a range into the selection tool's dialog box, which allows you to define only a brightness range with values from 1 to 256, not specific colors.

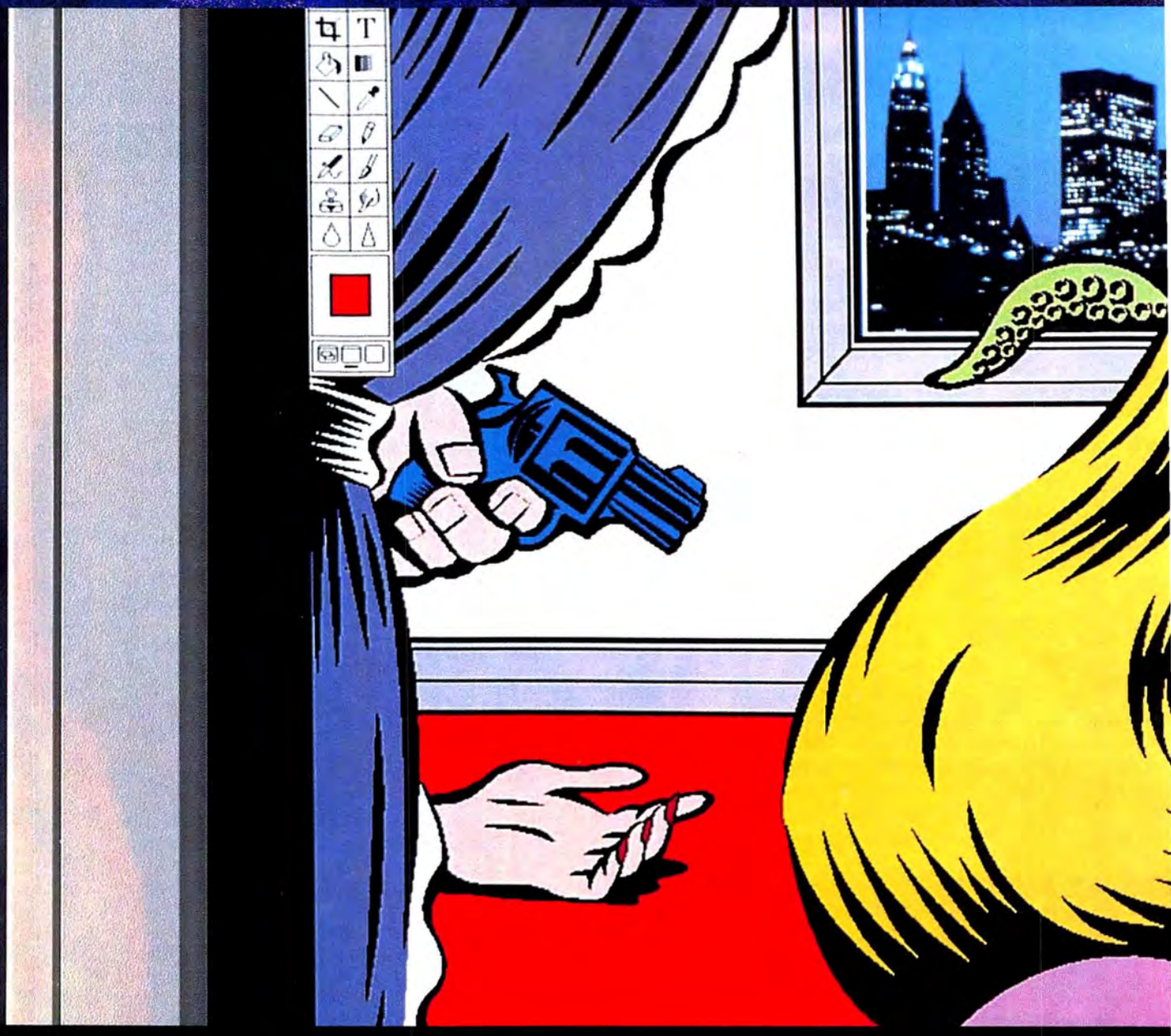
ColorStudio lets you type in several choices in the Options dialog box, including Exact Color, Exact Mask, Close Hues, and Value (brightness) Range. In addition, you can specify ranges of colors to select by example and through a dialog box. This plethora of methods gives professionals plenty of flexibility but is likely to intimidate novices.

No auto-select tool can choose exactly the area you want every time. Fortunately, all these packages let you manually add to or subtract from a selection. In addition, these programs can automatically feather or blend a selection's edges so that when you paste in a Clipboard image, you can get around hand-retouching ragged edges and avoid sharp breaks in shade or tonality.

ColorStudio and Photoshop allow you to control numerous edge-blending elements. These include border depth (the number of pixels adjacent to the selection marquee that will be blended with those in the border of the underlying image), edge vignette (how gradually the selection's border fades to transparent), and blending with underlying shades (the number of pixels used in the dithered pattern that blends the selection border with the background).

Another helpful technique in all aspects of image retouching is masking. Masks delineate an area so that you can't accidentally alter it. In PhotoMac and Photoshop, everything but a selected area automatically becomes a mask. Photoshop has a command that lets you paste into or behind a selection and lets you store masks permanently in as many as 13 separate 8-bit (256-color) layers.

ColorStudio has its own approach to masking. There is a single mask layer for the image, but a separate mask accompanies all incoming Clipboard images. You can use the mask from the Clipboard, the original's, or both. This lets you use the selection's mask and the document's mask in a variety of combinations by including the masked regions of the selection and the document in the final effect or excluding them.



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What a Color-Retouching Program Can Do for You



dramatically improve an image's appearance. And because you generally get instant feedback on the results, even a novice can learn how to use these controls quickly. In addition, you save considerable turnaround time and money by doing your custom photo processing in-house, especially if the photos need retouching.

Although it is often necessary to heighten photographs' contrast to add drama, it is important not to get carried away, because too much contrast can obscure details of highlight and shadow. By using color-balance controls, you can alter the orange cast that appears in photos shot at sunrise or the greenish cast that appears in pictures shot under fluorescent lights. You select a specific area and then use the color-balance controls to play down, eliminate, or replace colors. This color-balancing technique also works for tinting or colorizing black-and-white photos.

Photoshop and ColorStudio give you the option of arbitrary gamma control, which lets you manually control the hue (color), saturation (intensity), and value (brightness) of colors in specific portions of an image's gamma curve. Arbitrary gamma control lets you add drama to a picture by boosting contrast in the middle tones while maintaining detail in the deep shadows and bright highlights. Being able to control a color's hue, saturation, and value makes it possible to tint the picture or replace one color with another in a selected area. You can use arbitrary gamma controls to create several effects, including posterizing, which involves reducing or eliminating the range of shading in each color so that all colors are flat. If you want to use the image as a template for tracing, you can use arbitrary gamma controls to reduce large areas to solid colors, simplifying tracing.

All three color programs can reverse each color to its complement (the hue opposite it on a color wheel), so you can directly convert a scanned film negative to its true-color positive version. Only PhotoMac, however, can do it while compensating for the orange mask usually present on color negative film, such as

Figure 3: Retouching

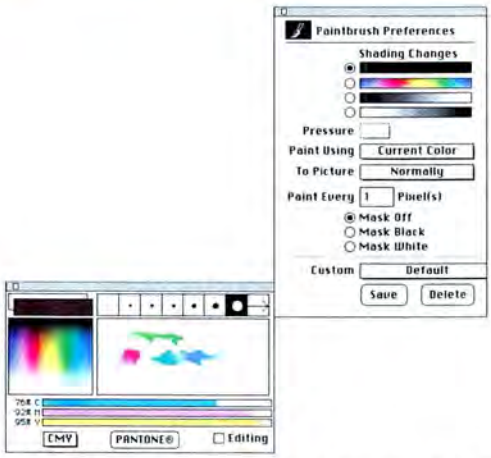


Figure 3a: ColorStudio's color-mixing palette provides five shapes for feathering the edges of paint as you lay the paint down. One powerful painting option is the ability to pick up and paint with a pattern from any selection.

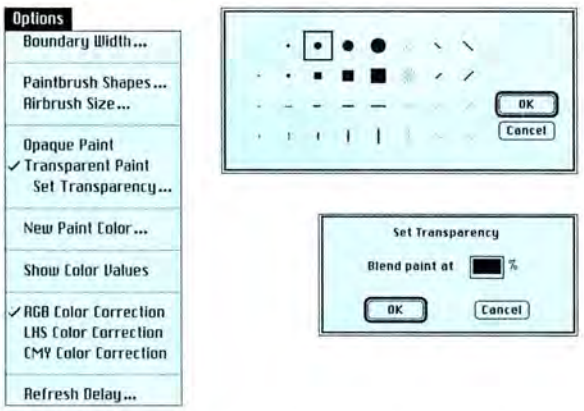


Figure 3b: PhotoMac's retouching capabilities stick to the basics but cover the needs of midlevel users. Brush options are limited to size, shape, and transparency (chosen from the Options menu). There's no way to adjust paint so that it only lightens or darkens or to paint with the texture of another portion of the image.

Kodacolor. If you try to convert a scanned color negative in ColorStudio or Photoshop, you'll have to correct the color manually to eliminate the orange mask.

The last darkroom procedure is to scale the two images to the same proportions and to rotate them if necessary.

Retouching

Once I had set the color balance and completed the equivalent of conventional darkroom work on my two example images, it was much easier to retouch small flaws in the photos. There were several in the portrait: a white speck on the subject's lip, ruddy and blotchy skin, and uncombed hair.

The traditional techniques for repairing these flaws would require several expensive hours of an airbrush artist's time, even if the photos were only black-and-white. The methods for retouching color by hand are even more painstaking and costly.

With "electronic darkrooms," repairing small imperfections simply means painting over them or blending them into the background. With experience, you can use painting and blending techniques to accomplish even more elaborate retouching, such as removing a coffee stain or getting rid of tree branches that appear to be growing out of a subject's head.

The trick is to retouch the photo so that the results look natural — or at least don't draw attention to your handiwork. This skill requires practice: Painting over subtle shading changes with a flat or slightly mismatched color can make the cure worse than the disease. If you're a beginner, you'll need to take some time to learn and practice the kind of retouching you see in my sample photos. Once you have the skills, however, a job like this one takes only about an hour — or less with the brush-blending, tinting, and transparency options in ColorStudio and Photoshop.

Image-processing software provides tools for picking up colors and texture patterns, such as wood grain, hair, or grass, making it relatively easy to match precisely the colors and shades of the areas surrounding a

The Alternatives

Do you — and your budget — really need all the features and options that color image-processing programs provide? After all, paint programs such as SuperMac's PixelPaint Professional, Deneba's UltraPaint, and Electronic Arts' Studio/32 generally cost less and have many similar capabilities.

These three paint programs feature versatile brushes that can smudge, lighten, darken, and pick up color. PixelPaint Professional has special Emboss and Trace Edges features. But most paint programs have no user controls for overall color balance and contrast. UltraPaint is the exception, but it lets you change only overall lightness and contrast and it doesn't work with 16- or 24-bit-color images.

Paint programs are getting better at the business of image creation and painting, but they aren't optimized to do photo retouching. They can't blend or smooth as subtly, and it's virtually impossible to do color balancing with them.

Paint and photo-retouching applications make good partners: Paint programs can each help in their own way with retouching spots, blending edges, and even combining multiple images. Indeed, they may well suit your needs fully if you don't need to balance brightness, contrast, and color or go directly to high-end prepress. You can also use them to compensate for the creative weaknesses of a high-end retouching program.

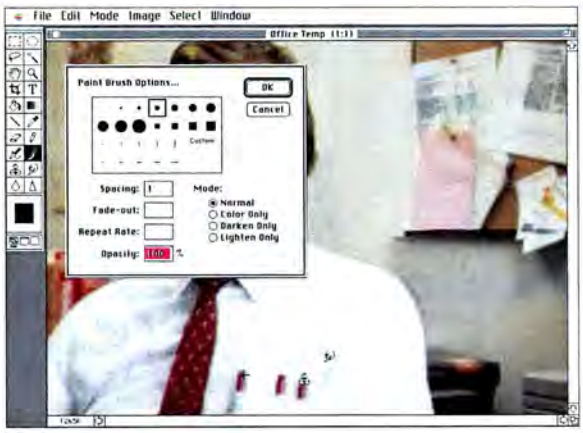


Figure 3c: Photoshop's brush options are more than adequate for all but the most demanding image-processing tasks. Although the dialog box is less intimidating than ColorStudio's, it can't stay on-screen while you work. The rubber-stamp tool lets you pick up part of the picture in one area of the screen and brush it into another area. The finger (smudge) tool lets you blend pixels together.



defect. With Photoshop and ColorStudio, you can pick up whole parts of an image and then brush them into another area. Where possible, I used this technique to repair the CEO's skin blotches, remove shadows, and fill in the hairline.

To make a touch-up unobtrusive, you have to blend its edges into its surroundings. Virtually all image-processing-software toolboxes contain brushes for smudging, blurring, or sharpening edges. Photoshop and ColorStudio also give you the option of automating all brush-stroke blending. Both applications let you specify the degree of anti-aliasing (shading pixel edges to make diagonal lines appear smooth rather than jagged) and feathering (making the edges of a selection slightly translucent so that it merges smoothly with the area onto which it's placed). You can also use a brush to lighten, darken, or tint an area. Photoshop and ColorStudio let you specify that your brush color be used only on colors lighter or darker than it. All three programs let you specify the degree of transparency of colors.

To prepare the portrait for pasting into the office setting, I decided to eliminate the portrait's background. ColorStudio, PhotoMac, and Photoshop make this easy by letting you reverse a selection — that is, you can deselect what's currently selected and select what was previously unselected. All I needed to do was carefully lasso the subject's head, reverse the selection, and press the Delete key to delete the background and isolate the head.

Image Compositing

Once I had made the two photos look their best, I needed to combine them into one picture. The camera may never lie, but image-processing applications can sure make it look as if it did. Giving a jogger the feet of a jackrabbit or placing the Taj Majal in Times Square are well within these programs' scope.

Image compositing is the most complicated of the four image-processing functions. It requires at least four steps: selecting, cutting, manipulating, and pasting.

Although the process of creating

Figure 4: Composite Images



Figure 4a: Unlike Photoshop, ColorStudio has no Paste If command (which determines which portions of a floating image will affect the target image), so some composites require complex masking operations (see the Mask Options box at the right of the screen). Masks can be applied to both the image and the floating selection. You can change the transparency setting (under the icons at the top of the vertical scroll bar) by typing a number from 1 to 10.



Figure 4b: PhotoMac automatically masks the area around a selection, but it has no mask layers, nor does it allow you to paste into or behind an existing selection, as you can in Photoshop. PhotoMac automatically blends selections as you paste them down, but you can't set the degree of blending or feathering.

an intricate composite can be challenging at first, the basic techniques are fairly easy to apply. In this case, I seamlessly replaced Mr. X's head with the CEO's head. I laid the foundation for this step at the darkroom stage by scaling and rotating the two images so that they would fit together and by making them match in color and intensity.

To create my composite image (also known as a photomontage), I opened both files simultaneously — which is possible in all three applications — and then selected the CEO's head and neck, copied it to the Clipboard, switched to the office-setting file, and pasted the Clipboard image in. The CEO's head floated above the office scene until I dragged it to the right place and deselected it, dropping it permanently into position.

Depending on how carefully you have outlined the selection in a situation like this, you may have to do some retouching such as smudging together poorly matching edges, reconstructing a detail that got lopped off during the original copy operation, or taking other steps to make the pasted item blend naturally with the background. In a simple case such as this, blending is no problem. In compositing several images, however, the way a program allows you to blend selections becomes vital (see the "Selecting and Masking" sidebar).

Both ColorStudio and Photoshop have very powerful masking abilities. Masking uses one or more layers to protect or affect specific portions of an image and even specific aspects of an image, such as color only or brightness only. The extent of a photoretouching program's masking abilities is a good measure of its overall power and of the time you save when using it.

All three applications allow users to specify the transparency of pastes and fills. Transparent fills let you quickly add shadows to combined images to make the combination look natural and unified. A transparent fill is especially effective in combination with feathering or gradient-shape fills in making the edges of shadows fade out. (A gradient fill smoothly blends the shading of two or more colors over a specified distance. A gradient-shape fill makes the blended tones conform to the shape of the selected area.)

To get finished composites to look realistic, you often have to rotate, slant, and size incoming images to match the target photo's perspective before the final pastedown. Photoshop and ColorStudio let you type precise vertical and horizontal dimensions to specify sizes and exact degrees of rotation. Photoshop also has on-screen rulers, which are a big help when you're scaling a selection to fit precisely into its place in the underlying image.

Sometimes you need to combine two or more images created in different applications or on different computers. The three image-manipulation applications make combination possible without the dramatic shifts in color that result when the images' color palettes do not match. There are

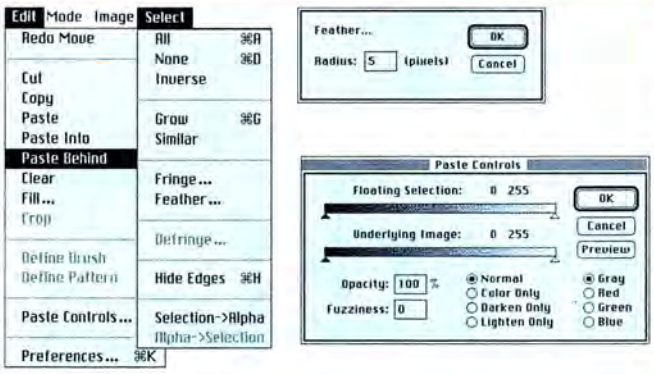


Figure 4c: Photoshop can store as many as 13 separate layers, or alpha channels. It has excellent options for blending floating selections with the image. A unique Paste function (see the Paste Controls box at the lower right) lets you vary the transparency of highlights and shadows in either the Clipboard or the main image.

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two true-color models: One is the cyan, magenta, yellow, black (CMYK) model, in which colors are created by combinations of cyan, magenta, yellow, and black and which is used for images that are printed on light-reflecting media such as paper. The other model is RGB (red, green, blue), in which all colors are combinations of red, green, and blue; it is used for images that are viewed by transmitted light, such as on a monitor, TV, or color slide (see "Color Techniques and Technologies," May '90, Buyer's Guide, page 4).

Typically, CMYK is best for images that are to be conventionally printed, because it matches the number and colors of the printing plates used and it enables you to deal with printing houses. It's desirable for an image-retouching program to work in these and several other color models so that it can adapt to your working style and output needs.

Finally, if you want to put images together, it should be easy to import them into the color-retouching application you use. As long as the image is a TIFF, PICT, or PICT2 file, you won't have any trouble.

Of the three, Photoshop has the most-flexible options for file conversion, making it possible to send images to and from almost every popular graphics file format for either the Mac or DOS machines.

Pictorial Effects

The fourth and easiest part of using image-processing software is producing pictorial effects. The most common effects let you blur, sharpen, or posterize; you can also get interesting results by using filters, which change an image or selection's style by altering the relationship of one pixel's color and size to another's.

A filter that "adds noise," for example, gives images a high-contrast, grainy, "documentary" look; a filter that makes small shaded areas look like dabbed brush strokes gives them a painterly look.

With 22 options on its menu plus five third-party filters, Photoshop is the specialist in pictorial effects. Both Photoshop and ColorStudio accept plug-in filters from third-party vendors, and Photoshop lets you create

Figure 5: Pictorial Effects

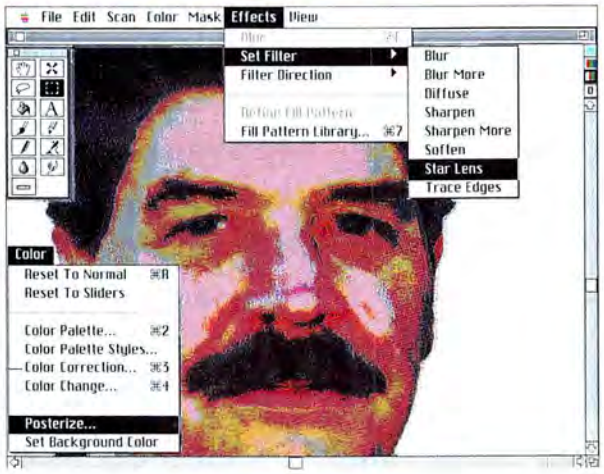


Figure 5a: ColorStudio accepts third-party "plug-in" filters (miniprograms), letting you change images' appearance. You add new filters by installing them with ColorStudio's Resource Mover. A few filters come with the program; others can be developed or obtained from third-party developers. This image was posterized, and then the Star Lens effect was applied to give it a diffused look.



Figure 5b: PhotoMac provides only a few basic, but fundamentally necessary, effects, including Sharpen, Smooth, and Blend Boundary. In this screen, the Smooth command softened the office clutter behind the CEO.

Table 1: Color-Retouching Features

● = yes, ○ = no	Letraset ColorStudio	Data Translation PhotoMac	Adobe PhotoShop
List price	$1,995	$795	$895
Comments	A full-featured package suitable for those who want control over every aspect of photo retouching.	A reasonably priced package for anyone with basic photo-retouching needs.	Plenty of options and intuitive interface make this a good package for novice and expert.
Editing			
Auto-select multiple shades/colors	●	●	●
Reverse selection	●	●	●
Gradient fills	●	○	●
Transparent paste/double exposure	●	●	●
Image control			
Transparent paint	●	●	●
Specify transparency	●	●	●
Paint on lighter/darker colors	●	○	●
Brushes			
Predefined shapes	38 per brush	32	24
Custom shapes	●	○	●
Anti-alias brush	●	○	●
Brush with part of image	●	○	● (rubber stamp)
Special effects			
Filters	13	2	22
Third-party plug-ins	●	○	●
Other			
File formats	6	3	14
Enter text	●	○	●
Calibration	●	○	●
Manufacturer	Letraset USA 40 Eisenhower Drive Paramus, NJ 07653 (201) 845-6100	Data Translation, Inc. 100 Locke Drive Marlboro, MA 01752 (508) 485-3322	Adobe Systems P.O. Box 7900 Mountain View, CA 94039 (415) 961-4400

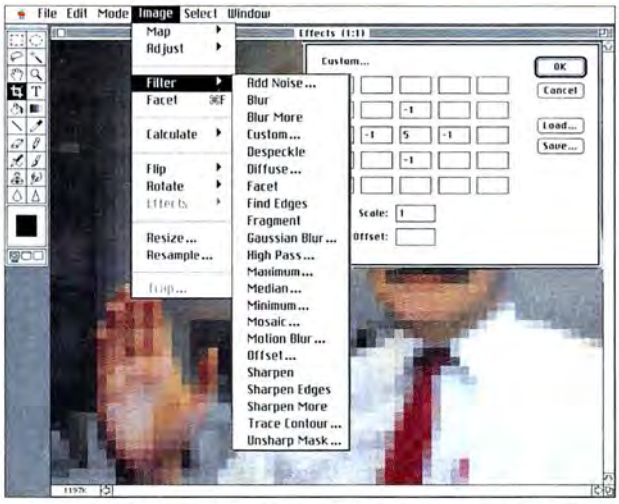


Figure 5c: Photoshop allows for plug-ins, but it also provides 22 special-effects filters such as Facet and Mosaic (see the Effects menu midscreen). You can make custom filters by typing numbers into the matrix of boxes at the right of the screen.

Directory

Adobe Systems, Inc.
1585 Charleston Road
P.O. Box 7900
Mountain View, CA
94039-7900
(415) 961-4400
Photoshop 1.0, $895

Blue Solutions, Inc.
3039 Marigold Place
Thousand Oaks, CA
91360
(805) 492-9973
PhotoPress, $295

Data Translation, Inc.
100 Locke Drive
Marlboro, MA 01752
(508) 485-3322
PhotoMac 1.5, $795
PhotoMac Edit (without color-separation capabilities), $495

Deneba Software
3305 N.W. 74th Ave.
Miami, FL 33122
(800) 622-6827
UltraPaint 1.0, $199

Electronic Arts
1820 Gateway Drive
San Mateo, CA 94404
(415) 571-7171
Studio/32, $695

Letraset USA
40 Eisenhower Drive
Paramus, NJ 07653
(201) 845-6100
ColorStudio 1.1, $1,995
ImageStudio 1.5, $495

Micro Frontier, Inc.
7650 Hickman Road
Des Moines, IA 50322
(515) 270-8109
Enhance 1.01, $375

Public domain
Image, available from user groups and on-line services

Silicon Beach Software, Inc.
9770 Carroll Center Road, Suite J
San Diego, CA 92126
(619) 695-6956
Digital Darkroom 1.1, $395

SuperMac Technology
485 Potrero Ave.
Sunnyvale, CA 94086
(408) 245-2202
PixelPaint Professional 1.0, $699



your own filters.

Using obvious pictorial effects, such as posterizing or mosaic patterning, would have been inappropriate for the composite portrait of the CEO. Instead, I blurred the background slightly to make the subject seem more prominent.

All in all, I was able to produce a usable image out of materials at hand with a little experience and a minimum of effort and expense.

Retouching for Everyone

Adobe's Photoshop is a good product for all levels of image retouching. It has an intuitive and easy-to-learn interface, even for new users, and its extensive arsenal of tools and features makes it possible to produce just about any effect.

Letraset's ColorStudio is a more complex product. Its market is graphics professionals, especially in the prepress arena, who desire precise control over every aspect of the darkroom, retouching, and output process. It has especially strong retouching options, such as blending and masking. At just under $2,000, ColorStudio is clearly aimed at the professional prepress market. By the time you read this, Shapes, an annex to ColorStudio, should be available. It

Gray-Scale Retouching

If you work only with gray-scale images, you don't need an image-retouching application with color capabilities. Retouching gray-scale images requires many of the same tools as color-image manipulation does, but it avoids the complexity of dealing with separate color layers.

Early versions of gray-scale editors displayed only 64 or 128 shades of gray, but current versions show the complete range of 256 shades of gray possible in an 8-bit image. Unless you plan to work with 24-bit-color images, any one of the applications mentioned here should fit your needs.

Digital Darkroom 1.1 is the current version of Silicon Beach Software's pioneering image-editing application. Digital Darkroom introduced innovative features such as the magic-wand tool, which makes selections based on gray levels, and transparent pasting, which for the first time let users blend a pasted selection into a target image (see Figure A). Digital Darkroom also introduced gray-level masking, which locks all the pixels of a particular shade or range of gray, preventing them from being altered while the mask is in effect. And Digital Darkroom was the first package to offer an auto-trace function, converting gray-scale images to a collection of Bezier-curve outlines that you can edit in applications such as Adobe Illustrator or Aldus FreeHand.

Digital Darkroom displays 256 shades of gray, although its palette has only 128 grays, and can open only one image at a time. It can save images in PICT2, TIFF (1-bit dithered, halftone, advanced halftone, and gray-scale), ThunderScan, MacPaint, and its own compressed archive format, and it can export its auto-traced objects as Illustrator-compatible PostScript files. It can open files in PICT, TIFF (1-bit, halftone, and gray-scale), MacPaint, and ThunderScan format. Version 1.1 adds an Image Preview feature, which displays a thumbnail version of the image in the Open dialog box and shows the size and resolution of the image.

Unlike the other gray-scale editors, Enhance 1.01 from Micro Frontier requires System 6.03 and 32-bit Color QuickDraw, even though it's limited to working with 8-bit images. Enhance is more than a gray-scale editor — it's also an 8-bit-color editor, and it sports a respectable set of image-analysis tools.

Enhances's main benefit is its speed: Its filter operations are much faster than those of any of the other applications. It also offers sophisticated contrast and brightness controls, including gamma correction.

Enhance lets you use up to three image buffers per image, so you can use one for the original image, one for the altered image, and the third for masking. Area masking is quite simple — it changes only the mask's black pixels. You can use area masks in painting and in pasting operations. Enhance's various tool options let you designate



Figure A: Precision is the key to successful image retouching. Digital Darkroom's Paste functions offer ample control over blending and overlaying images.



Figure B: Enhance's Paint Options dialog box offers user-selectable gray-level masking.

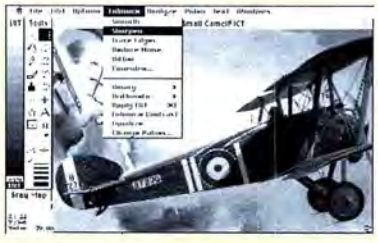


Figure C: Image has a useful set of filters for improving gray-scale images, although it's primarily a tool for quantitative analysis of medical and scientific images.

will let you import illustrations from EPS images. You can work with objects in the drawing layer as you would in any PostScript drawing package.

PhotoMac from Data Translation is a sound, reasonably priced product for anyone with occasional and straightforward photo-manipulation needs. Its basic selection of darkroom, retouching, and photomontage techniques allows you to quickly and easily prepare images for publication.

Ken Milburn, a former advertising and editorial photographer, writes about Mac and IBM computer graphics.

The Bottom Line

To test the interface, features, and ease of use of Adobe Photoshop, PhotoMac from Data Translation, and ColorStudio from Letraset, a couple of scanned photos were retouched and a composite image was created for publication.

Adobe **Photoshop** ($895) has more power than most of us ever need, but it makes it all accessible and largely discoverable by the broadest range of users. It neither overpowers the novice nor bores the master.

PhotoMac ($795) offers respectable power and a straightforward interface.

ColorStudio ($1,995), firmly aimed at high-end users, is not nearly as comfortable to work with as PhotoMac or Photoshop, although, oddly, it has tool modes that are clearly not for photo retouching but, rather, for playful and creative color work. Its power focuses on numerically precise color control and output.

gray levels (or ranges of levels) on which the tools will have no effect, providing a second level of masking (see Figure B).

Enhance has a nonstandard interface, but context-sensitive help is always available. You can open up to four images at once, making it good for montage work. It can open PICT, TIFF (compressed and uncompressed), and text files, and it can save images as PICT, TIFF, text, or EPS files.

Image is a public-domain software package written by Wayne Rasband of the National Institutes of Health. It's primarily a tool for numerical analysis of scientific and medical images, but it has some useful features for photo retouching, such as contrast enhancement and gray-level equalization, which allows you to change the distribution of gray levels. It also contains filters for sharpening, blurring, tracing edges, and reducing noise (see Figure C).

Image directly supports two frame-grabber cards for acquiring images from video sources: The Data Translation QuickCapture card and the Image Systems Technology Video Image 1000. With the latter card, it can capture frames in real time at 30 frames per second.

Letraset's ImageStudio was the first full-fledged image-processing package for the Mac. It introduced the fingertip (smear) tool and the water-drop (blur) tool. It was also the first application to offer masking and basic filters for sharpening, blurring, and diffusing. ImageStudio favors tools such as brushes, fingertip, and water drop over more-technical controls (see Figure D).

ImageStudio 1.5 displays all 256 shades of gray, but it has a palette of only 16 grays plus black for editing. You can define which shades of gray appear in the palette by entering a percentage, or you can select the gray shade you need from the image surface itself.

ImageStudio's masking options are limited to protecting the current selection from modification, and it lacks some amenities such as auto-scrolling and the ability to open multiple documents. ImageStudio is also particularly weak in selection-handling abilities, lacking a polygon, an oval, and selection-refinement options. It's also unable to rotate a selected area arbitrarily. It does, however, offer a wide range of brush effects, including the ability to paint on only lighter or darker pixels than the currently selected shade. There's also a Fade option that mimics a brush's running out of paint at the end of a stroke.

ImageStudio can open files in uncompressed TIFF, MacPaint, ThunderScan, and Letraset's own RIFF format. It can save images as RIFF, TIFF, MacPaint, or EPS files.

Blue Solutions' PhotoPress is a straightforward gray-scale editor with 8-bit-color capabilities. It can open and save PICT2 and uncompressed TIFF images. The number of open images is limited only by available RAM. It lacks Digital Darkroom's and Enhance's sophisticated gray-level masking and variable paste operations. However, it offers workable area masking; a user-definable gray map; and a useful set of filters, including Dither (to produce a high-quality black-and-white image), Focus, Soften, and Blend (see Figure E).

PhotoPress can convert color images to gray-scale and gray-scale images to black-and-white line art. PhotoPress has one unique feature: a Slide Show command that lets you view several images one after the other.

All the applications mentioned here offer good control over halftoning, including screen frequency and angle, and a choice of line or dot screens.

— Bruce Fraser



Figure D: ImageStudio's brushes offer delicate controls, such as pressure sensitivity, to mimic working with a real brush.

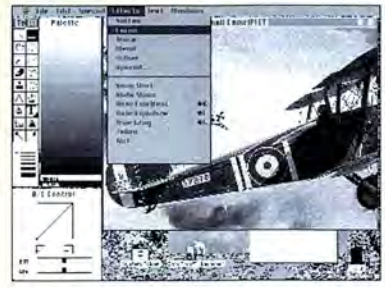


Figure E: PhotoPress is a straightforward entry-level gray-scale editor with a useful set of filters.



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POWER PRESENTATIONS

As catchphrases go, desktop presentations never really caught on — but that didn't stop presentations from becoming a desktop staple. Combine the Mac's graphic and color capabilities with special presentation software, and you have all the tools you need to create stunning presentations.

The following three articles take you on a tour of the state of presentations today, starting with software. In presentation programs, it's a two-horse race between Microsoft and Aldus. "The Hidden Persuasion" looks at one of the leaders — Aldus Persuasion — and offers 30 tips and techniques for enhancing your persuasive powers. (For a look at Microsoft's PowerPoint, see "The Presentation Pitch," December '88, page 244.)

If you've ever wanted to make 35mm slides rather than overhead transparencies, turn to "The Best Picture Show." You'll get the inside scoop on working with slide-imaging centers as well as tips on how to create professional-looking slides without unpleasant surprises. The article also includes a synopsis of your options in presentation software.

And if you thought slides and overheads were the only tools for giving a presentation, think again. "Running the Show" showcases the latest technogoodies — from LCD panels to remote controls — that let you project the Mac's screen in living color without tying you to the keyboard.

We can't give your presentation for you, but the information in these articles will help you make the perfect pitch.





By Peter Polash

THE HIDDEN PERSUASION

There's more to Aldus Persuasion than meets the eye. The program's developer reveals 30 surefire ways to enhance your persuasive powers.

6 Ways to Automate Format Changes

1. Make changes to body text, organization charts, and so forth on the slide master rather than on individual slides. All slides that use the master will be updated instantly.

Most people change the formatting for existing slides one at a time right on the slide, but one of Persuasion's unique features is that you can reformat all your slides simultaneously by making changes to the slide master. All slides based on the master immediately reflect the changes. This works for any placeholder change, including font, style, size, position, and fills. (Placeholders are markers that define the size, format, and location of objects on a master.)

2. Change the master for some but not all of its associated slides.

You can't do this, but Persuasion's multiple masters can produce the same result. Simply create a new slide master based on the old one by choosing Go to Master on the View menu and New from the submenu. Then select any subset of slides (by Shift-clicking) in the Outline or Slide Sorter view, and apply the new master. Reformat the new master to suit your needs, and you've finished.

3. Switch AutoTemplates to give your slides a new look.

Use the AutoTemplates command to quickly change the formatting for an entire presentation (see Figure 1). This is a convenient way to alternate between black-and-white overheads and 35mm color slides. Persuasion automatically replaces masters with the same names, reformats all slides, and replots charts to match the new design. The new AutoTemplate format also overrides any previously applied color schemes and defined text and chart formats.

4. Restore master formatting to an individual slide element.

Problem: You've made several changes to the body text of a slide — italicized some words and moved and resized the text block — but you don't like the results and want to restore the master's formatting.

Solution: In Slide view, use the pointer tool to select and delete the entire text block. Leave Slide view, and then return to it. Voilà — your body text has been reformatted and repositioned based on the master.

This shortcut works for any text that's linked to the outline, including titles, subtitles, and body text. For an organization chart, just select and delete the whole chart. (Note: A quick way to leave and return to Slide view is to click on the slide icon at the upper right corner of the window.)

5. Restore master formatting to an entire slide.

The fastest way to remove all local overrides — such as format and position changes to the title, subtitle, or body text — is to select None for the



Figure 1: Using the AutoTemplates command, you can quickly reformat an entire presentation. This presentation is being changed from an AutoTemplate for color 35mm slides to one for overheads (shown in the thumbnail view). Persuasion automatically reformats all the slides and replots all the charts to match the new masters.

Aldus Persuasion 2.0 lets you create a presentation with minimal effort. You simply choose 1 of the 36 AutoTemplate formats, type (or import) your ideas into the outliner, add graphics if you desire, and print the finished presentation as overhead transparencies or 35mm slides (or show it on-screen by using the Slide Show option). Each AutoTemplate has a distinctive design and contains six slide masters — one for a title slide, two each for text and graphics, and one for an organization chart — that help you format a presentation instantly. Persuasion can even produce audience handouts and speaker notes automatically.

Because Persuasion 2.0 is so easy to use, many users never discover how powerful it really is. It's the old 80/20 rule: 80 percent of the users use 20 percent of the features. With very little extra effort, however, you can harness Persuasion's power and produce more-polished presentations. You too can rearrange a presentation with the Slide Sorter, build sequential layers on a single slide, produce chart overlays, add transition effects such as wipes and dissolves, and modify the existing AutoTemplates or create your own.

Now that I've whetted your appetite, here are 30 tips and techniques that are guaranteed to improve your Persuasion productivity.

master and then reassign the original master.

3. Use chart placeholders.

You don't have to use chart placeholders, because you can plot a chart directly to any slide regardless of which master you're using, but you can easily use a chart placeholder by assigning a master containing one to the slide before you plot. A chart placeholder offers two benefits:

- You can adjust the size, positioning, and formatting of charts on several slides at once simply by changing the master.
- If you switch AutoTemplates, all the charts will automatically be replotted, resized, and repositioned to reflect the new template design.

7 Time-Saving Tips

1. Use "selective" Select All to choose all objects of a given type.

In Slide view, you can select all the objects created with a specific tool by choosing that tool and then using the Select All command (Command-A). If you choose the rectangle tool and choose Select All, for example, all rectangles are selected. Choose Select All again, and all objects on the slide are selected.

In Outline view, the Select All command has three levels of operation: Issuing the command once selects all the text in a single heading, twice selects all the headings of the same level that share the same superior heading, and three times selects all the visible headings in the outline.

2. Take advantage of the temporary and permanent defaults for drawing tools.

Permanent defaults are saved with your document. You can change them by selecting the pointer tool and choosing line styles, colors, or patterns from the Effect menu. (Make sure no objects are selected, or they will be affected by the changes.)

You can set temporary defaults by clicking on a drawing tool and then making selections from the Effect menu. The temporary defaults affect all the objects you draw until you choose another tool.

3. Edit the text in grouped objects such as charts, tables, and organization charts without ungrouping them.

Choose the text tool, click on the text in any group or chart — no matter how deeply nested it is — and proceed with your editing. You can also change the type style and apply superscripts or subscripts. (Note: Text changes you make to chart labels are automatically

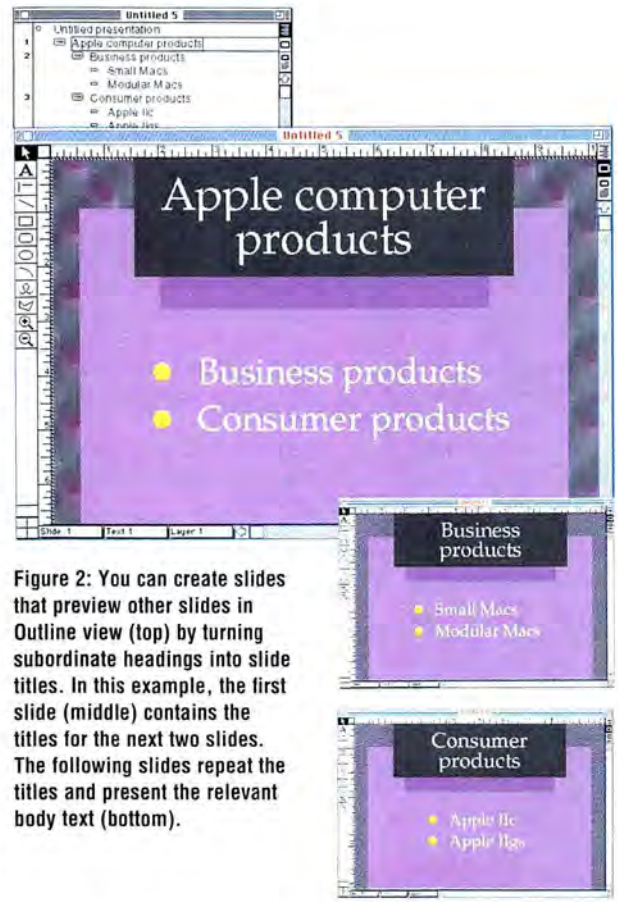


Figure 2: You can create slides that preview other slides in Outline view (top) by turning subordinate headings into slide titles. In this example, the first slide (middle) contains the titles for the next two slides. The following slides repeat the titles and present the relevant body text (bottom).

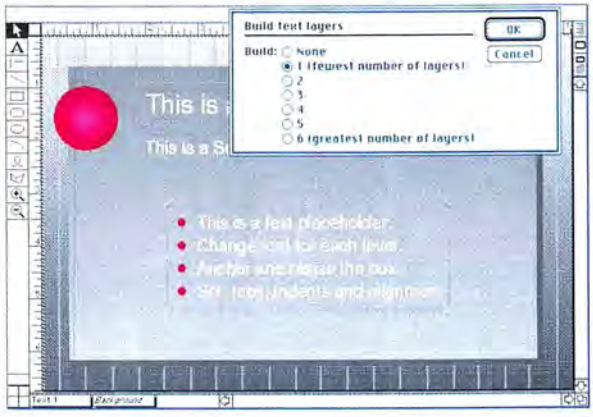


Figure 3: Slide builds let you reveal text or graphics one layer at a time. To create builds (or layers) for all text slides, go to the slide master, select the body-text placeholder, and use the Build Layers command. Choosing 1 in the dialog box, for example, means that every first-level paragraph becomes a new layer in the build.



Figure 4: You can independently apply fonts, styles, and colors to each level of body text on a master (top). The changes are dynamically reflected in all slides based on that master (bottom).

reflected in the data sheet.)

4. Create one or more preview slides automatically.

A preview slide gives an overview of a set of slides by listing their titles (see Figure 2). You create preview slides in the Outline view by using the Set Heading As command from the Outline menu to turn subordinate headings into slide titles. The subordinate slide title then appears twice, once as body text in the preview slide and again as the title of its own slide.

5. Let Persuasion keep your text blocks and organization charts centered on the slide.

You might want to keep a text block centered on the slide even if the text within the block is aligned on the left. Use the Anchor Placeholder command to do this. Few of Persuasion's AutoTemplates use center anchoring, so this feature is largely unknown.

Go to the slide master, select the placeholder for body text or organization chart, and choose Anchor Placeholder from the Master menu. Select both Center options, and you've finished. Now all the text that's contained in the placeholder, regardless of its size and alignment, is vertically and horizontally centered relative to the placeholder.

6. Create slide builds (or layers) automatically.

A build reveals a slide's text and graphics one layer at a time, in a manner similar to using a flip chart with acetate overlays. You can create builds manually by selecting objects in Slide view and sending them to different layers (using the Layer pop-up menu in the lower menu bar). But many users don't realize they can create builds for text and charts automatically for an entire presentation (see Figure 3).

The process is simple: Go to a slide master, select the appropriate placeholder, pick Build Layers from the Master menu, and choose a build option in the dialog box. All the slides based on that master are now layered. To see the builds, you can run the Slide Show or output them by checking Builds in the Print or Export dialog box. (Note: Builds print cumulatively — layer 1 on the first page, layers 1 and 2 on the second page, and so forth.)

7. Use AutoTemplates as more than just a collection of coordinated masters.

You can save any presentation as an AutoTemplate, and all the data, document attributes, and defaults are saved along with it. Similarly, you can open the original of any AutoTemplate (instead of a copy), modify it to fit your needs, and resave it.

Here are some possibilities for enhancing AutoTemplates. Set up level-specific text styles for the Outline view (you can always override the styles for individual characters and topics). Define drawing-tool defaults for patterns, colors, and line styles. Create your own color schemes. Save a collection of drawing objects or clip art on an unused slide, a notes page, a handout master, or the gray area of any slide (in other words, anyplace they won't print).

5 Best-Kept Secrets

1. You can create an entire presentation without using the outliner and still make full use of AutoTemplate formatting.

The key here is to choose New from the Slide pop-up menu. This gives you a brand-new slide with a dummy title and body text based on the slide master. Use the text tool to select the dummy text, and type in new text. You can use the Move Right and Move Left commands (on the Text menu) to alter the heading level of a paragraph, and the font and style automatically change to reflect the new level (if it is different on the master).

2. You can assign a different type style and color to each of the six levels of body text on a master.

Use the text tool to select one or more paragraphs of body text, and then choose the desired styles and color from the Text menu (see Figure 4).

3. You can mix tall and wide overheads in the same presentation.

Slide or overhead orientation is always based on the orientation of the master and is usually horizontal (wide). If you prefer an overhead with a vertical orientation, make a new master, don't give it a background (select None from the Background pop-up menu), and choose Tall Orientation from the Master menu. Any slide using this master is now tall instead of wide. This technique always works for overheads, but it's less reliable for slides, because some film recorders can't handle a tall orientation.

4. You can replace the default AutoTemplate without reinstalling the program.

When you install Persuasion, you have the option of installing one AutoTemplate as the default presentation; this file is called Persuasion Prefs and resides in the Aldus Folder (inside the System Folder). If you later want to make another AutoTemplate the default, you don't have to reinstall the program. Instead, just create a presentation and adjust the various settings to meet your needs. Save the file as a presentation called Persuasion Prefs and store it in the Aldus Folder, where it replaces the original file.

5. Persuasion does animation.

You can use Persuasion's layers to achieve animation effects. Say, for example, that you want to have a ball bouncing across the screen. First, copy and paste the ball at different positions on successive layers of the slide. On each layer, hide the ball from the previous layer by using a solid rectangle whose fill is the same color as the background. Similarly, you can build text word by word (or letter by letter) by sending the appropriate characters of

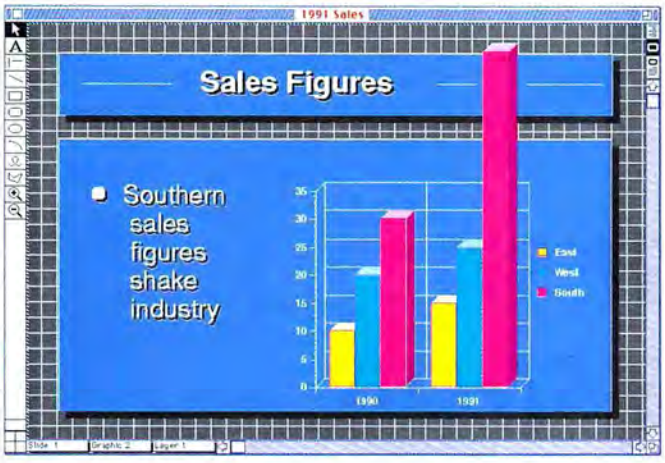


Figure 5: By changing a chart's plot range, you can literally send data through the roof. To achieve this effect, reduce the Plot Range Maximum in the Value Axis Format dialog box.

the text block to different layers.

Note: When you paste or draw new objects, they always go to the current drawing layer. You can change the drawing layer by choosing it from the Layer pop-up menu when no objects are selected.

5 Charting Tips

1. Let your chart data go through the roof.

You can emphasize expanding sales figures by changing a chart's plot range so that the largest numbers literally go off the chart (see Figure 5). Select the chart, and then choose Axes from the Chart menu and Value Axis Format from the submenu. When the dialog box appears, reduce the value for Plot Range Maximum. Now the longest bars (or highest points) will extend beyond the chart axes.

2. Use Persuasion's "warm" links to quickly replot charts linked to external spreadsheets.

You can open a spreadsheet from another program (if it's saved in text or WKS format) and use it to plot selected information. Persuasion maintains a link to this external file, enabling you to update a presentation quickly if data in the original spreadsheet changes. Simply use the Data Sheet command to open the external spreadsheet, select the data to be replotted, and click on the Replot button on the menu bar.

3. Spice up your charts with some variety by treating them as drawing objects (which they are).

You can flip charts vertically or horizontally and reposition legends and pie slices by double-clicking and dragging (see Figure 6). You can add round corners to bars via the Round Corners command on the Draw menu as well as ungroup any chart and alter the individual elements.

4. Improve the appearance of a resized chart, using the Redraw Chart command.

When you stretch or resize a chart in a drawing program such as Persuasion, the screen image may become distorted. If you select Redraw Chart from the Chart menu, the chart will be recalculated based on its new size and replotted, giving you a clean image.

5. Highlight key data points by enhancing individual chart elements.

You can change patterns, colors, and line styles for a single data element as well as for an entire series (see Figure 6). When you double-click on a bar, all the bars in the series are selected. If you double-click again, the individual bar is selected and you can alter its appearance without affecting other chart elements. Similarly, you can alter the tops and sides of bars, pie slices, and so on; make independent changes to major grids, minor grids, and tick marks; and enhance text for individual category and legend labels. (Note: You can use one triple-click instead of two double-clicks to select an individual chart element.)

7 Keyboard Shortcuts

1. Move between slides by holding down the Command key and pressing either the up arrow key (to go backward) or the down arrow key (to go forward).

2. Move between the Outline, Slide, and Notes views by holding down the Command key and choosing the right or left arrow key.

3. Use the Command key to make resizing easier.

You don't have to use the selection handles to resize selected objects. Just hold down the Command key and drag the mouse anywhere on the slide. You can reduce the effect of mouse movement by beginning the drag outside the selection and magnify it by starting the drag inside it.

4. Resize text blocks without leaving text-editing mode.

Just hold down the Command key and drag the left or right edge of the text block. This applies to all text blocks, including those in groups and charts.

5. Select objects behind other objects by using the Option key.

Sometimes you can see an object but can't select it because another object is in front of it. If you hold down the Option key and click, you can select an object behind the frontmost object. You can use this keyboard shortcut to select several unreachable objects in succession.

6. Change the default text style for one or more levels of the outline without using the Outline Styles dialog box.

Hold down the Option key while you choose any font, size, style, or color from the Text menu, and all the headings on the same level as the selected one change simultaneously. All the new headings have the new formatting, but local style overrides are preserved.

7. In the Outline view, you can show only first-level subordinates of a heading and hide all deeper levels by holding down the Command key and double-clicking on the heading icon.

To re-expand all the subordinates of the heading, hold down the Option key and double-click on the heading icon.

Software developer Peter Polash created versions 1.0 and 2.0 of Aldus Persuasion. A transplanted New Yorker, he is currently working on other software projects in his adopted city, Seattle.



Figure 6: You can highlight charts in a variety of ways with Persuasion's subselection and drawing commands. Subselection commands let you choose a single chart element for special formatting. For example, a triple-click on South selected that legend element for additional text formatting. To emphasize the South's impressive sales figures, the 1991 bar was subselected and given a brighter color. Because Persuasion's charts are objects, you can use draw commands or ungroup the charts and alter individual elements. This chart has been flipped vertically, and the legend has been repositioned by double-clicking and dragging. The bars are enhanced with rounded corners and heavier horizontal lines.



By Kathleen Tinkel

THE BEST PICTURE SHOW

There's more to making great-looking slides than the right presentation software. Here's how to get the best out of both your Macintosh and your slide-imaging center.

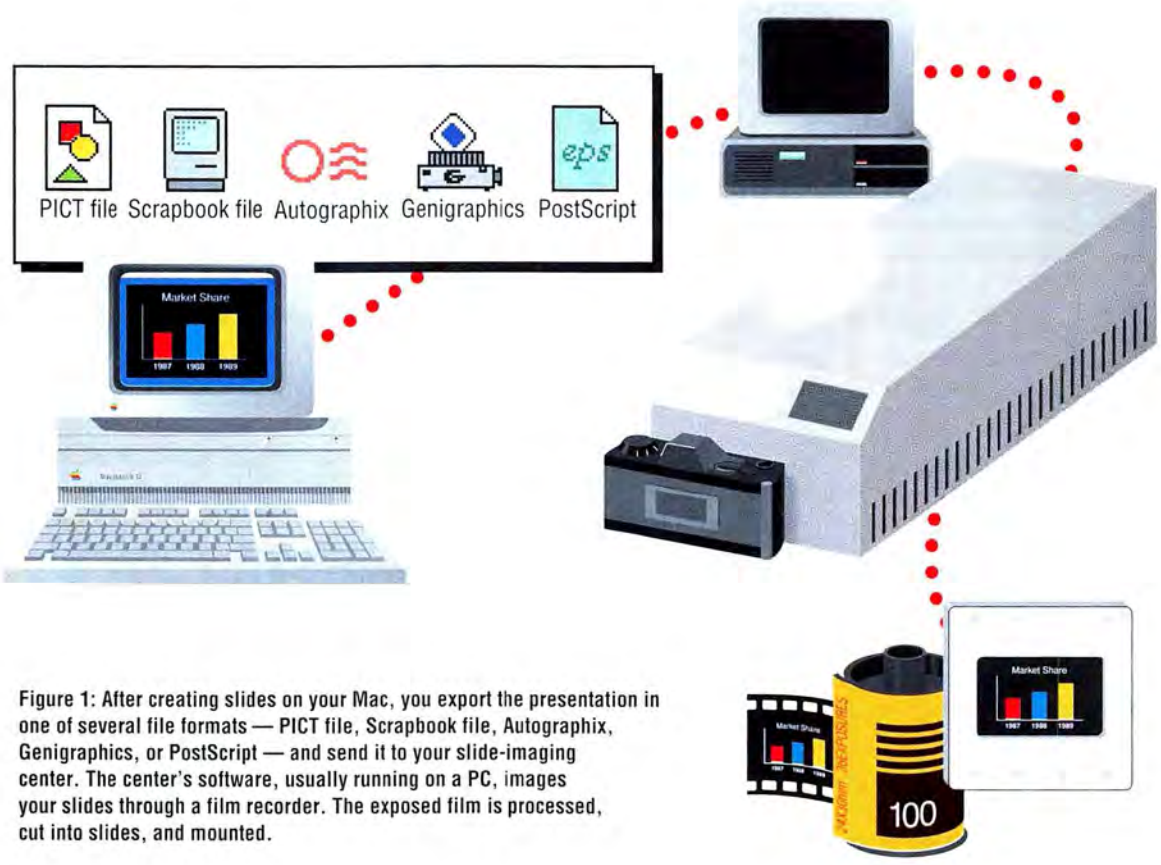


Figure 1: After creating slides on your Mac, you export the presentation in one of several file formats — PICT file, Scrapbook file, Autographix, Genigraphics, or PostScript — and send it to your slide-imaging center. The center's software, usually running on a PC, images your slides through a film recorder. The exposed film is processed, cut into slides, and mounted.

Colorful, portable, professional-looking — these are just a few of the adjectives that come to mind when you think of 35mm slides. If you also think that making slides on your Mac is easy, you're only partly right, but the good news is that it's getting easier every day.

On paper, the process of making a slide from the desktop looks straightforward (see Figure 1). You create slides on your Mac, using special presentation software such as Microsoft's PowerPoint or Aldus Persuasion (although special software isn't always necessary). When you're satisfied with the presentation you've created, you export it in one of several file formats — Autographix (AGX), Genigraphics, or PostScript, or as a PICT or a Scrapbook file — and send it to a slide-imaging center.

The center's software, usually running on a PC, images your slides through a special camera called a film recorder (for more information about film recorders, see "Graphics on the Slide," November '89, page 156). The exposed film is processed, cut into slides, mounted, and delivered to you, usually within 24 hours. In most cases, the slides look like your screen image.

The complicating factor is that slide-imaging systems and the Mac speak drastically different languages. For a long time, there were few ways to translate between them; now, however, there are solutions that work pretty well, and PostScript promises even smoother processing in the near future.

	Pros	Cons
PICT, Scrapbook	• Small files. • Can make slides from a wide variety of programs. • Scrapbook lets you store entire slide show in a single file.	• Separate PICT files can be hard to keep track of. • Limited to LaserWriter Plus font set. • Can be hard to find an imaging center that takes PICT or Scrapbook files.
Autographix	• Works with all presentation programs and MacDraw II. • Works consistently with all programs. • Automates slide-making process. • Lets the imaging center open document to edit slides.	• Cumbersome to rescale overhead format to 35mm format. • Can be confusing to use. • Limited to LaserWriter Plus font set. • Limited to Autographix imaging centers.
Genigraphics	• Works with all presentation programs and MacDraw II. • Works consistently with all programs. • Automates slide-making process. • Lets you store entire slide show in a single file. • Good manual.	• Cumbersome to rescale overhead format to 35mm format. • Can be confusing to use. • Limited to LaserWriter Plus font set. • Limited to Genigraphics imaging centers.
PostScript	• Works with sophisticated layout and graphics programs. • Lets you use wide range of fonts and type styles.	• Each slide is a separate document. • Takes time to print PostScript to disk. • Files cannot be revised easily. • Imaging centers that accept PostScript files can be hard to find.

Table 1: The type of software you use to create your slides, as well as your imaging center's facilities, will determine which output you should save your files in. Talk to the imaging center's personnel before deciding which format or printer driver to use.

Which Presentation Program?

If you're thinking of creating a slide show on your Mac, you've probably already read reviews of the major presentation programs: CA-Cricket Presents, MORE, Persuasion (see "The Hidden Persuasion," also in this issue), PowerPoint, and StandOut. Although these packages have different strengths and weaknesses, all are capable of generating artwork for 35mm slides and they're all increasingly competitive in terms of raw features and ease of use (see the "Presentation Software" sidebar, below, for each of these package's main features).

Presentation programs vary considerably in their feel and working style. If you don't already own a presentation package, it makes good sense to choose an imaging service center first and ask the staff members which software they know best. It may turn out that you don't need a special program at all. If you make only a few slides occasionally and don't need the outlining, organizing, or fancy charting functions of a dedicated presentation program, you might be able to use something you already have, such as Claris' MacDraw II. Among its other virtues, MacDraw II generates good PICT files.

If your imaging center can take any PICT file, you can also create slides with programs such as Silicon Beach's SuperPaint or Deneba's UltraPaint or Canvas. And if your imaging center accepts print-to-disk PostScript files, you can create slides from page-layout programs such as PageMaker and QuarkXPress as well as Illustrator and FreeHand. In most applications, you can print a PostScript file to disk by holding down Command-F while clicking on the OK button in the Print dialog box.

There are other good reasons for choosing your software and your imaging center at the same time. For one, if you're creating files to be imaged by Autographix or Genigraphics centers, it's wise to use their proprietary printer drivers (Mac Chooser documents) when you create slides. These printer drivers are included in some presentation packages. PowerPoint includes a copy of the Genigraphics driver, for example, and Persuasion includes the Autographix driver, AGXit!. If your software doesn't include one of these drivers and you want to use an Autographix or Genigraphics center, you can probably get the correct driver from the imaging center for a fee that is usually deducted from the cost of your first slide order. These drivers work with all presentation programs, so you're not locked into using one of the name-brand services if it would be more convenient to use another. Also note that the driver you use has no effect on the quality of your slides.

Most presentation programs work with Autographix and Genigraphics drivers (regardless of whether the drivers are included with the presentation software), and all support exporting files as PICT, Scrapbook, or PostScript formats that can be imaged on film recorders. This doesn't mean you have complete freedom of choice, however. Your imaging center can probably accept only one or two formats (see Table 1 to check where each output format is accepted).

To use one of these drivers, put it into your System Folder, and — preferably *before* you begin to create your presentation — select it from the Chooser. The proportions of a slide are different from those of your screen or an overhead transparency, and the driver determines which proportions you can work in. Converting an overhead to a slide or vice versa is not handled very well by the software — you have to rearrange the elements on each slide — so it's important to work in slide format from the outset.



Presentation Software

If you're shopping for a presentation program, start by asking your imaging center which software works best with its system — it may turn out that you don't need a special program at all. Here, briefly, are the major packages' pros and cons. (For a more detailed look at these programs, see "The Presentation Pitch," December '88, page 244, and "The Art of Persuasion and MORE II," May '89, page 126.)

CA-Cricket Presents

Computer Associates' Cricket Presents doesn't have a built-in outliner, but it can automatically make slides from Acta outlines. It has strong charting and graphics tools.

MORE

This descendent of ThinkTank, marketed by Symantec, was originally billed as an "idea processor." MORE 3.0 emphasizes outlining — in fact, many people who use MORE as an outlining and organizing program hardly know about its presentation capabilities. MORE 3.0 includes the ability to produce charts, a much-needed feature absent from earlier versions.

Persuasion

One of the two most popular presentation packages (Microsoft's PowerPoint is the other), Aldus Persuasion is a graceful Swiss army knife of a program. Its many templates range from basic to wild and provide lots of inspiration for your own designs. It also provides an interactive outliner and competent drawing and charting tools. Many service-center operators are familiar with Persuasion and PowerPoint, which may make them better able to support these programs than others.

PowerPoint

Microsoft's PowerPoint doesn't have many bells and whistles — no built-in outliner, no flashy graphics. You can import graphics and outlines only from ThinkTank or the first version of MORE, neither of which is used much anymore. Despite these limitations, many service-center operators consider PowerPoint the most reliable and stable of all Mac presentation programs.

StandOut!

Letraset's StandOut! focuses on layout, graphics, and typography. It has no outliner, nor can it import outlines from other sources; it does accept word-processing documents, however. StandOut! provides great control over imported images and type (including a search-and-replace function that some layout programs could use).

Some imaging centers have more than one way of imaging slides from a Mac. A center affiliated with one of the traditional slide-imaging companies — Autographix, Dicomed (formerly Crosfield Dicomed), Genigraphics, or Management Graphics — cannot image files made with a competitor's printer driver. They may, however, accept PICT or Scrapbook files, on the one hand, or PostScript on the other, as well as their own files. You have to ask.

Choosing a Slide-Imaging Center

No matter how effective your presentation software, you're most likely to produce good slides if you have a strong working relationship with your imaging center. Before making your first slide, talk to — or better yet, visit — a few imaging places. A good slide house can contribute more to your success at slide making than any other decision you make. If you're lucky, you'll find one with an especially capable person (probably known as "the guru") who understands Mac files, fonts, and film-recorder technology. These gurus see thousands of slides and have a good idea of what works and what causes problems. Follow their advice.

It's important to find an imaging center that processes the film *and* makes the slides. Don't choose by price alone. In fact, a fair price — around $7 to $12 per slide — is one of the signs of a competent service bureau with operators who can take time to answer your questions and help you produce high-quality slides. If the prices are too low, they may be rushing jobs out the door or relying on older film recorders. If the prices are too high, the place may be badly managed or it may not be seriously in the imaging business. Most slide houses accept files on-disk or by modem, returning your slides by overnight express (for a premium) or by regular mail.

Most cities have several imaging centers or slide shops. You can find them listed in the telephone directory under headings such as Slides, Computer Graphics, or Audio-visual Production. A few are listed in the booklets that come with presentation-software packages, but these lists are often out of date and not always complete. Genigraphics has a nationwide toll-free number; it routes your files to the closest imaging center. (See the directory in this article for more information on how to find the right imaging center.)

Although there are unaffiliated shops, most imaging centers are either independent licensees of Autographix, Dicomed, or Management Graphics, or they are branches of Genigraphics, which operates its own service centers. To confuse matters further, Autographix also operates its own imaging centers, which compete (at higher prices, generally) with its licensees.

Autographix. Autographix-based imaging centers are everywhere. Some are part of Autographix itself, and some are independent service centers. Of the latter, some are "authorized," which means they've negotiated an exclusive right to advertise as Autographix imaging centers in a particular city or region. You often find the best prices at centers that aren't authorized, because they don't have to pay a fee to Autographix for every slide they image.

The Autographix printer driver works with all the major presentation programs, but as with the Genigraphics driver, some users find it trickier to use than systems that work with PICT or Scrapbook files. There are trade-offs either way — a system that can make a slide from a

Using Fonts in Slides

If you're used to the WYSIWYG relationship between the Mac screen and a laser printer for fonts, the hit-or-miss link between your Mac and a film recorder can come as quite a shock. Your best hope is to follow to the letter the directions provided with your software and printer driver (if available). Confirm those rules with your service center, and then run test slides that show all the fonts in different weights, styles, and combinations.

The following tips can help you control the fonts in your slides:

- Select any Zapf Dingbats, and confirm that no style — bold or italic — has been assigned to them, by looking in the Style menu. It's all too easy to inadvertently assign styles to the bullets when you're styling text. These styles are not supported for Dingbats, so they won't be obvious on-screen, but having the nonexistent attributes assigned is enough to confuse film recorders. When your slides come back, you'll find an *n* or *l* or *h* where you wanted a bullet.
- Use only the fonts recommended by your imaging center. You can't use Adobe versions of the standard font set (the fonts you get with your System disk or LaserWriter) with Genigraphics, Dicomed, Autographix, or some of the other imaging systems. The safest procedure is to use a font-management utility such as Suitcase II or MasterJuggler. Make two separate suitcases of the font sets: one enhanced (Adobe or another version with all the weights and styles), the other containing your System and LaserWriter fonts plus the large screen fonts that come with your presentation software. Before making a slide, close the enhanced font set and open the plain one. If you don't and you accidentally select, say, B Avant Garde Bold instead of plain Avant Garde (which you then make boldface with the Style menu), the film recorder will probably substitute another font.
- When doing a rush job, use only Times or Helvetica. Film recorders are less likely to have problems with these basic fonts.
- Turn off ATM (Adobe Type Manager) and use screen fonts while working with slides. ATM is designed to create screen fonts from Adobe printer fonts. These fonts don't exactly match the weights and widths of the Apple fonts that were used as standards for those built in to film recorders. As a result, lines of type in the slides may be longer or shorter than what you saw on the screen, possibly ruining the slide.
- If you find you're using font sizes for which you have no screen versions, use Specialty Software's FontSizer II to create large screen fonts in additional useful sizes. (You'll need a LaserWriter for this.) Film recorders create their fonts on the fly, so any size will be crisp and clear on your slide, but it's hard to see the type clearly while you're working in the presentation program.

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Just for the Fun of It (Games)

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Just for the Fun of It (Games) *(continued)*

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28652	Reach for the Stars *(Electronic Arts)*	$25
28626	Road Racer *(XOR)*	$39
28616	Sargon IV *(Spinnaker)*	$29
28640	Shadowgate *(Mindscape)*	$28
28666	Shufflepuck Cafe *(Broderbund)*	$22
28678	SimCity *(Broderbund)*	$28
28680	SimCity Supreme *(Broderbund)*	$47
28710	SpaceQuest *(Sierra-On Line)*	$28
28712	SpaceQuest II *(Sierra-On Line)*	$28
28664	Star Wars *(Broderbund)*	$23
28622	TaskMaker *(XOR)*	$26
28606	Tetris *(Spectrum Holobyte)*	$18
28608	Tetris—Color Version *(Spectrum Holobyte)*	$21
28660	Hunt for Red October *(Software Toolworks)*	$31
28644	Uninvited *(Mindscape)*	$28
28604	Welltris *(Spectrum Holobyte)*	$19
28672	Where/ Carmen Sandiego *(Broderbund)*	$28
28674	Where/Europe Carmen *(Broderbund)*	$28
28676	Where/USA Carmen *(Broderbund)*	$28
28662	Starfleet *(Electronic Arts)*	$35

Music & Sound

27998	ConcertWare + MIDI *(Great Wave)*	$98
27960	Jam Session *(Broderbund)*	$29
27978	SmoothTalker *(Byte)*	$31

The Graphic Arts

Mostly Drawing

29232	Canvas *(Deneba Software)*	$186
29206	ClarisCAD 1.0 *(Claris)*	$589
29234	Cricket Draw *(Cricket)*	$169
29238	Dreams 1.1 *(Innovative Data Design)*	$315
29784	Freehand 2.0 *(Aldus)*	$326
29788	Illustrator 88 *(Adobe)*	$275
29240	MacDraft *(Innovative Data Design)*	$167
29204	MacDraw II 1.1 w/ ATM *(Claris)*	$291
29222	SuperPaint *(Silicon Beach)*	$124

Mostly Painting

29236	Cricket Paint *(Cricket)*	$176
29202	MacPaint II 2.0 *(Claris)*	$94
29228	PixelPaint *(Supermac)*	$223
29230	PixelPaint Pro *(Supermac)*	$387

Mostly Graphics Editing

29224	Digital Darkroom *(Silicon Beach)*	$260
29790	ImageStudio *(Letraset)*	$273
29218	Model Shop *(Paracomp)*	$378
29266	Photoshop *(Adobe)*	$498
29242	Studio/1 *(Electronic Arts)*	$95
29244	Studio/8 *(Electronic Arts)*	$295
29226	Super3D *(Silicon Beach)*	$313
29220	Swivel 3D *(Paracomp)*	$294
29212	Videoworks II Accelerator *(Macromind)*	$119
29210	Videoworks II Hypercard *(Macromind)*	$60

Graph & Chart Makers

29806	Cricket Graph 1.3 *(Cricket)*	$113
29260	DeltaGraph *(DeltaPoint)*	$97

Presentation Managers

29258	Accelerator *(Macromind)*	$124
29804	Cricket Presents 2.0 *(Cricket)*	$283
29216	Director *(Macromind)*	$436
29782	Persuasion *(Aldus)*	$327
29798	PowerPoint 2.01 *(Microsoft)*	$246

Certificate & Award Generators

29810	Certificate Library *(Springboard)*	$17
29808	Certificate Maker *(Springboard)*	$21
29812	Top Honors *(Springboard)*	$57

Graphic Utilities, etc.

29794	LetraStudio *(Letraset)*	$273
29264	Curator *(Solutions Int'l)*	$71
30380	SmartScrap & Clipper *(Solutions Int'l)*	$45

Graphic Art Collections

29252	Click Art Business *(T/Maker)*	$32
29256	Click Art Christian *(T/Maker)*	$37
29254	Click Art Holidays *(T/Maker)*	$32
29818	EPS Business Art *(T/Maker)*	$82
29816	EPS Illustrations *(T/Maker)*	$83
29246	Smart Art 1 *(Adobe)*	$83
29248	Smart Art 2 *(Adobe)*	$83
29250	Smart Art 3 *(Adobe)*	$83

Optical Character Recognition

30610	OmniPage 2.0 *(Caere)*	$535

Do It Yourself Programming

30426	101 Scripts&Buttons *(Individual Software)*	$35
27582	Just Enough Pascal *(Symantec)*	$46
27588	Prototyper *(Smethers Barnes)*	$183
27590	QuickBasic *(MicroSoft)*	$64
27580	Supercard *(Silicon Beach)*	$127
27586	THINK C *(Symantec)*	$163
27584	THINK Pascal v3.0 *(Symantec)*	$160
30416	TMON *(Icom Simulation)*	$87
27592	Turbo Pascal *(Borland)*	$67

Safety, Maintenance & Repair Utilities

Data Organization

30354	DiskTop 4.0 *(CE Software)*	$63
30434	On Location *(On Technologies)*	$75
30402	Suitcase II *(Fifth Generation)*	$43

Data Storage Management & Repair

30420	Complete Undelete *(1st Aid Software)*	$36
30362	Copy II Mac *(Central Point)*	$22
30410	Disk Tools Plus *(Electronic Arts)*	$31
30422	DiskExpress II 2.0 *(ALSOFT)*	$54
30392	DiskFit *(SuperMac Software)*	$58
30404	FastBack *(Fifth Generation)*	$106
30375	INITPicker *(Microseeds Publishing)*	$39
30364	Mac Tools 1.0 *(Central Point)*	$43
30394	Network DiskFit *(SuperMac Software)*	$223
30436	Norton Util/Mac *(Norton Utilities)*	$79
30378	Redux *(Microseeds Publishing)*	$51
30384	Retrospect *(Dantz Development)*	$152
30340	Sum II *(Symantec)*	$92
30344	xTree Mac *(xTree)*	$52

Shortcut & Time Saving Utilities

30348	CanOpener *(Abbott Systems)*	$63
30430	Clip Share 1.0 *(Olduvai)*	$138
30388	LaserSpool *(SuperMac)*	$87
30390	LaserSpool 5-Pack *(SuperMac)*	$286
30428	MacPrint 1.1 *(Insight Development)*	$94
30360	MockPackage Plus Util. *(CE Software)*	$30
30408	On Cue *(Icom Simulations)*	$35
30400	PowerStation *(Fifth Generation)*	$33
30356	QuickKeys *(CE Software)*	$62
30418	Shortcut *(Alladdin)*	$45
30382	SuperGlue *(Solutions Int'l)*	$61
30386	SuperSpool *(SuperMac)*	$58
30352	Tempo II *(Affinity Microsystems)*	$97

Data Security Utilities

30406	DiskLock *(Fifth Generation)*	$106
30370	MacSafe II *(Kent marsh LTD)*	$105
30366	QuickLock v1.0 *(Kent marsh LTD)*	$55
30396	Sentinal *(Supermac)*	$86
30368	The Night Watch v1.03 *(Kent marsh LTD)*	$85

Screen Saver Utilities

30424	After Dark *(Berkley Systems)*	$24
30399	Pyro *(Fifth Generation)*	$21

Virus Detectors & Eradicators

30342	SAM *(Symantec)*	$63
30412	Virex *(HJC Software)*	$51
30414	Virex (10 Pack) *(HJC Software)*	$346

Other Utilities

30350	Affinifile *(Affinity Microsystems)*	$44
30376	Screen Gems *(Microseeds Publishing)*	$39



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24731	800K Floppy Drive *(Fujitsu)*	$145
24730	2.4M Floppy Drive *(Kennect Technologies)*	$325
24732	DaynaFile 5.25" 1.2MB Floppy	$550
24733	DaynaFile 5.25" 360K/1.2MB	$725
24930	Rapport Disk Drive *(Kennect Technologies)*	$195
24380	20MB Ext. Protegé HD *(CompuAdd)*	$345
24386	20MB Ext. HD *(Cutting Edge)*	$335
24381	40MB Ext. Protegé HD *(CompuAdd)*	$395
24387	40MB Ext. HD *(Cutting Edge)*	$430
24390	40MB Ext. Qtm. Protegé HD *(CompuAdd)*	$455
24382	80MB Ext. Protegé HD *(CompuAdd)*	$525
24388	80MB Ext. HD *(Cutting Edge)*	$579
24391	80MB Qtm. Protegé HD *(CompuAdd)*	$645
24383	100MB Ext. Protegé HD *(CompuAdd)*	$649
24389	100MB Ext. HD *(Cutting Edge)*	$779
24392	105MB Ext. Qtm. Protegé HD *(CompuAdd)*	$695
24180	20MB Int. HD - SE *(CompuAdd)*	$295
24184	20MB Int. HD -Mac II *(CompuAdd)*	$295
24181	40MB Int. HD - SE *(CompuAdd)*	$325
24185	40MB Int. HD -Mac II *(CompuAdd)*	$325
24182	80MB Int. HD - SE *(CompuAdd)*	$465
24186	80MB Int. HD -Mac II *(CompuAdd)*	$465
24183	100MB Int. HD -SE *(CompuAdd)*	$575
24187	100MB Int. HD -Mac II *(CompuAdd)*	$575
24384	Bernoulli 40-40 *(IOmega)*	$2,185
24385	Portable 44MB *(IOmega)*	$1,850
23830	QT-40 40MB Tape Sys *(Tecmar)*	$950
23831	QT-80 80MB Tape Sys *(Tecmar)*	$1,225
24931	QT-40 Cable Kit *(Tecmar)*	$106
26080	QT-80MB/2 Cart. *(Tecmar)*	$85
57440	3.5" Diskettes 1.2MB 10Pk" *(Sony)*	$29
57401	3.5" Diskettes 800KB 10Pk" *(Sony)*	$15
41601	Teak 3.5" Double Rolltop Box	$29
41600	Teak 3.5" Single Diskette Box	$20

Printers, Scanners & FAXes

56800	HP LaserJet Series II *(Hewlett-Packard)*	$1,699
22851	MicroLaser PostScript w/ATalk*(Texas Inst)*	$2,114
22850	DeskWriter Inkjet *(Hewlett-Packard)*	$849
56339	LQ-2550 - 24 pin Prtr. *(Epson)*	$999
56340	LQ-510 - 24 pin Prtr. *(Epson)*	$339
56303	LX 810 - 9 pin Prtr. *(Epson)*	$195
22852	Label Printer *(Seiko Inst.)*	$195
22752	Half-page Scanner *(Complete PC)*	$313
22753	Page Scanner *(Complete PC)*	$758
22758	Computer Eyes B/W Scan *(Digital Vision)*	$196
22759	Computer Eyes Color *(Digital Vision)*	$344
22750	Scanjet w/interface*(Hewlett-Packard)*	$1,689
22755	300Z Color Scanner *(MicroTek-IMSI)*	$2,049
22756	MS-II B&W Scanner *(MicroTek-IMSI)*	$1,080
22757	Thunderscan Plus *(Thunderware)*	$199
22751	ScanMan 32 *(Logitech)*	$345
22701	DoveFax-Ext. *(Dove)*	$270
22700	TeFAX RA2110 *(Relisys)*	$1,095
26902	Labels for Seiko Label Printer *(Seiko)*	$11.99
38713	Second Paper Drawer *(Texas Inst.)*	$325
38712	Envelope Feeder *(Texas Inst.)*	$299
38564	Appletalk Comm. Cd. 232 *(Texas Inst.)*	$125
38563	1MB Memory Upgrade Kit *(Texas Inst.)*	$399
38311	MicroLaser Toner Cartridge *(Texas Inst.)*	$59

Communications - Modem

49525	1200 Ext. w/o SW *(CompuAdd)*	$89
49557	2400 Ext w/o SW *(CompuAdd)*	$129
22306	Datalink Express *(Applied Eng.)*	$215
22308	Datalink Macport. *(Applied Eng.)*	$299
22307	Datalink Mac *(Applied Eng.)*	$325
49501	Smartmodem 1200 *(Hayes)*	$299
49576	Smartmodem 2400 *(Hayes)*	$385
49578	Smartmodem 9600 *(Hayes)*	$895
22507	NetModem V2400 *(Shiva)*	$435
22528	NetModem V.32 9600 baud *(Shiva)*	$1,289
22309	MMPL5 Protocal adapt. *(Applied Eng.)*	$79
22310	Send Fax Adapter *(Applied Eng.)*	$79

Communications - Network

22500	Nodem Thick *(Adaptec)*	$395
22527	Nodem Thin *(Adaptec)*	$395
22508	Ethergate *(Shiva)*	$1,825
22510	FastPath 4 Gateway *(Novell)*	$1,935
22509	Interbridge *(Hayes)*	$645
22520	Localtalk Conn. DB-9 *(Interex)*	$32
22521	Localtalk Conn. Din-8 *(Interex)*	$32
22524	MacCon II/E *(Asanti)*	$395
22529	MacCon II/E UTP *(Asanti)*	$395
22530	MacCon SE30/E *(Asanti)*	$395
22531	MacCon SE30/ETP *(Asanti)*	$395
22526	MacCon SE30/TK *(Asanti)*	$395
22533	MacCon SE/E *(Asanti)*	$295
22525	MacCon SE/ETK *(Asanti)*	$295
22532	MacCon SE/ETP *(Asanti)*	$292
22505	NetBridge *(Shiva)*	$339
22504	NetSerial X232 *(Shiva)*	$275
22511	PhoneNet Connector DB-9 *(Farallon)*	$34
22513	PhoneNet Connector Din-8 *(Farallon)*	$31
22517	PhoneNet Repeater *(Farallon)*	$313
22515	PhoneNet Star Conn. 10 pk *(Farallon)*	$138
22512	PhoneNet Star Connector *(Farallon)*	$18

Communications - Network *(continued)*

22516	PhoneNet Star Controller *(Farallon)*	$888
22514	PhoneNet to Localtalk Adapt. *(Farallon)*	$31
22534	PhonNet Din-8 10pk *(Farallon)*	$215
22519	Portable Pack *(Farallon)*	$373
22518	Star Wiring Kit Harmonica *(Farallon)*	$64
22506	TeleBridge *(Shiva)*	$339

Monitors & Video Cards

22006	19" Mon. w/Color Bd. 208 *(Rasterops)*	$3,990
22008	L-View Multi. Mon. w/card *(Sigma Designs)*	$1,495
22002	14" Color Monitor w/o card *(Seiko Inst.)*	$595
22000	19" Colormax w/card *(Sigma Designs)*	$4,999
22100	PageView 15" Mon. Mac II *(Sigma Designs)*	$1,050
22101	PageView 15" Mon. SE *(Sigma Designs)*	$999
22106	PageView 15" Mon. SE/30 *(Sigma Designs)*	$1,050
22005	14" Mon. w /Color Bd. 208 *(Seiko/Rasterops)*	$909
22001	14" Mon. w/Color Bd. 264 *(Seiko/Rasterops)*	$1,119
22103	SilverView 21" Mon. SE/30 *(Sigma Designs)*	$1,599
22104	SilverView 21" Mon. Mac II *(Sigma Designs)*	$1,599
22107	SilverView 21" Mon. SE *(Sigma Designs)*	$1,599
22007	GS30 Grey Scale 19" Mon. *(Rasterops)*	$1,614
23538	Color Board 208 *(Rasterops)*	$344
23531	Color Board 264 *(Rasterops)*	$554
23539	Color Board 264/SE-30 *(Rasterops)*	$690
23530	Multiscreen Card *(Mobius)*	$295

Accelerator & Expansion Boards

23632	Acc. 030 25mhz II w/co 68882 *(DayStar)*	$1,149
23633	Acc. 030 33mhz II w/co 68882 *(DayStar)*	$1,539
23638	Acc. 030 40mhz II w/co 68882 *(DayStar)*	$1,919
23639	Acc. 030 50mhz II w/co 68882 *(DayStar)*	$2,309
23644	Acc. 030 25mhz IIx w/co 68882 *(DayStar)*	$1,149
23645	Acc. 030 33mhz IIx w/co 68882 *(DayStar)*	$1,539
23646	Acc. 030 40mhz IIx w/co 68882 *(DayStar)*	$1,919
23643	Acc. 030 50mhz IIx w/co 68882 *(DayStar)*	$2,309
23647	Acc. 030 50mhz IIcx w/co 68882 *(DayStar)*	$2,309
23640	Acc. 030 25mhz IIcx w/co 68882 *(DayStar)*	$1,149
23641	Acc. 030 33mhz IIcx w/co 68882 *(DayStar)*	$1,539
23642	Acc. 030 40mhz IIcx w/co 68882 *(DayStar)*	$1,919
23636	Acc. Dove 33mhz SE-30 board *(Dove)*	$445
23637	Acc. Dove SE 020 w/881 & 1MB *(Dove)*	$777
23634	Acc. IIci CACHE Card *(DayStar)*	$754
23733	DigiVideo B/W Card *(Aaps)*	$399
23735	DigiVideo Color Card *(Aaps)*	$644
23731	MicroTV *(Aapps)*	$275

Memory Expansion

25480	2 X 1MB SIMMS (80ns) *(Technology Works)*	$138
25482	4 X 1MB SIMMS (80ns) *(Technology Works)*	$276
25481	4 X 4MB SIMMS (80ns) *(Technology Works)*	$1,900
25484	4 X 1MB SIMMS FX *(Technology Works)*	$436
25483	4 X 1MB SIMMS NTX *(Technology Works)*	$436

Keyboards, Mice, Etc.

25184	15 function key module *(DataDesk)*	$37
25283	Little Mouse *(Mouse Systems)*	$77
25180	Mac-101 Keyboard, ADB *(DataDesk)*	$134
25181	Mac-101 Keyboard (beige) *(DataDesk)*	$134
25282	Mobius Cordless Mouse *(Mobius)*	$89
26885	Bit Pad Plus *(Summagraphics)*	$318
25183	Switchball *(DataDesk)*	$115
25182	Switchboard *(DataDesk)*	$174
25284	Trackball ADB *(Mouse Systems)*	$72
25280	Turbo Mouse Plus *(Kensington)*	$107
25281	Turbo Mouse ADB *(Kensington)*	$107

Power Supplies & Fans

26880	Fanny Mac (fan) *(Mobius)*	$58
26888	System Saver Mac Plus *(Kensington)*	$62
26889	System Saver Mac SE *(Kensington)*	$62
26293	Powerchute Ntwk UPS Software *(A.P.C.)*	$99
26292	UPS, Uninterruptible supply *(A.P.C.)*	$275

Sound Interfaces

23730	MacRecorder *(Farallon)*	$162
23732	MIDI Interface *(Passport Designs)*	$76

Accessories

41753	Keyboard drawer *(CompuAdd)*	$19
41019	Kleen Keyboard Kit *(CompuAdd)*	$10
26883	SE Anti-Glare Filter (platinum) *(Kensington)*	$32
26882	SE Anti-Glare Filter (beige) *(Kensington)*	$32
26891	Apple RGB Anti-Glare Filter *(Kensington)*	$62
26886	HyperDialer *(DataDesk)*	$32
26895	Imagewriter II Dust Cover *(Cover-up)*	$8
26897	LaserWriter II Dust Cover *(Kensington)*	$12
26898	MacAvenue Carrying Case *(Pace)*	$65
26901	MacAvenue Carrying Case Ext. Kbd. *(Pace)*	$76
26892	Mac II Stand & Cable Kit *(Kensington)*	$63
26887	Mac II System Stand *(Kensington)*	$20
26894	Mac Plus/SE Dust Cover *(Cover-up)*	$8
26893	Masterpiece Mac II *(Kensington)*	$103
26896	Universal Printer Stand *(Kensington)*	$15
25580	Mac II Monitor Stand *(Kensington)*	$62
25582	Tilt/Swivel Stand *(Kensington)*	$21
26884	Security Kit *(Kensington)*	$33
41752	Teak KB Drawer PSK 132 *(CompuAdd)*	$69
26903	The Library (grey) *(Innovative Technology)*	$12

Software

Writing & Publishing

Word Processing (Writing)

30600	FullWrite Prof. *(Ashton-Tate)*	$253
30586	MacWrite II 1.1 w/ ATM *(Claris)*	$157
30582	Microsoft Word *(Microsoft)*	$245
30580	Microsoft Works *(Microsoft)*	$177
30584	Microsoft Write *(Microsoft)*	$77
30602	Nisus *(Paragon Concepts)*	$236
30590	WordPerfect Mac *(WordPerfect)*	$229
30588	WriteNow *(T/Maker)*	$116

Page Layout (Publishing)

29792	Letraset Ready-Set-Go *(Letraset)*	$273
29781	Pagemaker *(Aldus)*	$497
29822	Publish-it *(Timeworks)*	$223
29802	Quark Xpress 2.11 *(Quark)*	$455
29796	Silicon Press *(Silicon Beach)*	$51
29814	Springboard Publisher *(Springboard)*	$107

Utilities for Writers/Publishers

30606	Acta Advantage *(Symmetry)*	$63
30618	Big Thesaurus1.0 *(Deneba Software)*	$63
30594	Findswell *(Working Software)*	$35
30440	Letter Writer Plus *(Power Up)*	$54
29820	MacKern *(ICOM Simulations)*	$113
30604	More II *(Symantec)*	$265
29786	PageMaker Color Ext. *(Aldus)*	$133
29800	QuarkStyle 1.0 *(Quark)*	$165
30598	QuickLetter *(Working Software)*	$72
30622	WordFinder 2.0 *(Microlytics)*	$31

Spelling Checkers

30620	Spelling Coach Pro 3.1 *(Deneba Software)*	$112
30596	Spellswell *(Working Software)*	$44

Fonts & Font Utilities

	Adobe Fonts All 134 available	CALL
30444	Freedom of Press *(Custom Applications)*	$255
29824	Type Manager *(Adobe)*	$55
29828	Type Mgr/Type Align *(Adobe)*	$88
29830	Type Reunion *(Adobe)*	$38
29826	TypeAlign *(Adobe)*	$58

Business Software

Integrated & Bundled Applications

30182	Microsoft Office Bundle *(Microsoft)*	$525
30580	Microsoft Works *(Microsoft)*	$177

Accounting/Bookkeeping

28481	Accountant Inc. Prof *(Softsync)*	$348
28466	Business Sense *(Monogram)*	$265
28468	Checkwriter II *(Aatrix)*	$37
28464	Dollars & Sense *(Monogram)*	$78
28474	Easy-Light *(DAC)*	$41
28440	Insight Accounts Payable *(Layered)*	$395
28442	Insight Accounts Receivable *(Layered)*	$395
28454	Insight At Once *(Layered)*	$283
28444	Insight General Ledger *(Layered)*	$395
28446	Insight Inventory *(Layered)*	$395
28448	Insight Payroll *(Layered)*	$395
28450	Insight Time Bill *(Layered)*	$395
28478	MacMoney 3.5 *(Survivor Software)*	$58
28462	Managing Your Money *(Meca)*	$122
28458	Quicken *(Intuit)*	$35

Data Analysis & Presentation

28470	StatView II (Mac+,SE, II)*(Abacus Concepts)*	$278
28472	StatView SE + Graphics *(Abacus Concepts)*	$199

Database

27780	4th Dimension *(Acius)*	$511
27782	4th Dimension Runtime *(Acius)*	$85
27789	Claris Filemaker II*(Claris)*	$216
27804	Double Helix *(Odesta)*	$369
27790	FoxBase II *(Fox Software)*	$292
27792	FoxBase II Runtime *(Fox Software)*	$176
27796	FoxBase Mltuser Runtime *(Fox Software)*	$293
27794	FoxBase Multiuser *(Fox Software)*	$385
27798	Microsoft File *(Microsoft)*	$123
27808	Panorama (ProVue)	$246

Office Productivity Programs & Utilities

30442	Address book Plus *(Power-up)*	$52
27812	BulkMailer 3.3 *(Satori Software)*	$76
27814	BulkMailer Plus *(Satori Software)*	$187
30432	Calender Creater + Mac *(Power Up)*	$36
30358	Calender Maker *(CE Software)*	$30
27818	Data Desk 3.0 *(Odesta)*	$347
30438	Fast Forms 2.0 *(Power-up)*	$116
30372	Kiwi Envelopes *(Kiwi Software)*	$34
30440	Letter Writer Plus *(Power Up)*	$54
27816	MailList *(MySoftware)*	$27
27806	Milo (Paracomp)	$156
29200	Smartforms Designer *(Claris)*	$291

Time & Project Scheduling

29744	Fast Track Schedule *(AEC)*	$108
27810	KeyPlan *(Symmetry)*	$243
29740	MacProject II 1.1 *(Claris)*	$366

Personality... and Price

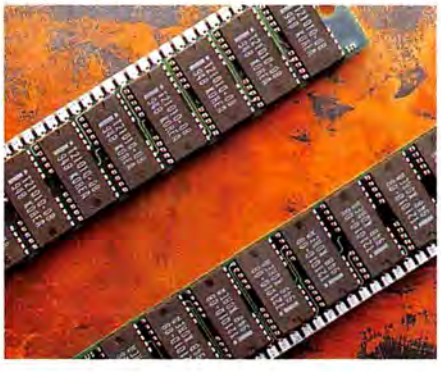
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Memory

Memory Power

Take advantage of MacAvenue memory bargains to upgrade your Mac Plus to 4MB of RAM or take your SE30 to 8 MB. MacAvenue offers only the best surface-mounted, 80-nanosecond memory products. To save the time and expense of installation, you'll get a step-by-step installation guide with a tool to "crack" the Mac Plus or SE. If you want to speed up printing of complicated graphics and heavily formatted reports, beef up your printer's RAM as well.

2 x 1MB SIMMs (80ns)	*25480*—$138
4 x 1MB SIMMs (80ns)	*25842*—$276



Software

Making Pages



PageMaker 4.0 — the new version of the most popular desktop publishing program — is loaded with new features that give you more control over graphics and typography. PageMaker 4.0 includes a spell checker, search-and-replace feature and all the capabilities of PageMaker Color Extensions.

PageMaker 4.0 *29781*—$497

Your Dollars Make Sense



If your financial affairs are a jumble and you're afraid of your checkbook, get a high-powered financial manager to help you clean up the mess. Dollars and Sense, one of the best-selling money management packages (four mice from MacUser), gives you control over budgets, investments and financial planning. Just ask this program the right questions and it will give you no-nonsense answers.

Managing Your Money *28462*—$122

MacAvenue's Fast Lane Leasing Program

MacAvenue's new leasing program is the best way to keep the latest equipment in your workplace without tying up your money with equipment purchases. Our leasing program gives you flexible terms to fit your budget and can usually be completed in one day. Once the agreement is finalized, we'll ship your equipment for next-day delivery. Ask your MacAvenue salesperson for more information about leasing. **Call 1-800-477-6221.**

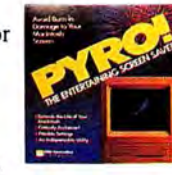
OK, Where is She?



She's eluded the most diligent sleuths the world over, and now she's at large in the U. S. of A. It's up to you to bring her to justice. "Who?" you ask? Carmen Sandiego, of course. Luckily, you'll have access to the crime lab computer and other resources to track Carmen from state to state. Be careful, it's a jungle out there!

Where in the USA is Carmen Sandiego *28676*—$28

Born on the Fourth of July



If you leave your monitor on for too long, it will burn itself out. Install Pyro! and you can rest easy. If your screen is unattended for too long, this Control Panel Device kicks on automatically and prevents phosphor burnout in your monitor by replacing the screen image with random visual pyrotechnics.

Pyro! *30399*—$21

Scanners

Color Scanner at a Gray-scale Price

The MicroTek 300Z Color Scanner is a full-featured color scanner — 16.8 million colors, 256 shades of gray, 24-bit color and 300 dpi resolution. You expect these features in a color scanner, but the MacAvenue bargain price will give you a double-take. This scanner is complete with Digital Darkroom image editing software.

300Z Color Scanner *22755*—$2049





Network

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When someone is talking about a Macintosh network, they're talking about Farallon PhoneNET connectors. You can't have a network without them. And it's better to have a few extras on hand because there's always someone else who wants to get connected.

PhoneNET Din-8	*22513*—$31
PhoneNET DB-9	*22511*—$34
PhoneNET 10-Pack	*22534*—$195

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If You Don't Want to Do It Yourself . . .

If you don't have the time, the resources, or the expertise to create your own slides, you can always have a slide show designed and produced by presentation specialists, such as graphic designers or the experts at your slide-imaging center. Here are some of the options:

Graphic Designers

There are firms that specialize in audiovisual, video, or multimedia productions, as well as general design studios. They may use traditional slide-creating techniques (using mechanicals imaged on precise, motor-driven staging cameras), computer graphics (using either high-end dedicated systems or small computers with off-the-shelf presentation software), photo and video equipment, or a combination of these techniques. You would probably use one of these firms when you needed to present stunning graphics or special effects, as their work is labor-intensive and usually very expensive.

Imaging Centers

Many imaging centers offer custom slide creation from your designs or theirs. Their dedicated computer-graphics systems offer more special effects than does the Mac with presentation software, and they run faster. It's one of the best approaches when you need slides in a hurry, and it's a good solution for the few tricky slides in a presentation you're producing yourself. Run out the simple slides from your software, and hand the more difficult ones to your imaging center's slide-production staff. They'll be able to match colors and type styles exactly, because they're outputting the rest of your job on the same equipment.

Management Graphics' Quick Chart

Even if you're on a budget, you can have slides — simple ones, at least — made without much effort. Management Graphics-based imaging centers may offer Quick Chart, a menu-driven slide-creation system. You use your Macintosh, a modem, and any telecommunications program to call in to the center. You then select the slide type (text, pie chart, and so on), enter text or values for charts, and let the remote system do the rest. The imaging center stores your basic format, including background and text colors; merges it with the data you transmit; and usually turns the slide around overnight.

PICT or Scrapbook file won't correct for your errors, but you can have more control while you're working. The Autographix (or Genigraphics) driver maintains the appropriate proportion of your slides, but you may feel as if the program is fighting you. (Once you've mastered it, however, it's reliable.)

Dicomed. One of the old-timers in the computer slide business, Dicomed formerly sold dedicated console systems. Today it sells film recorders and imaging software to independent slide houses. Dicomed cameras can image PICT or Scrapbook files exported from Persuasion, PowerPoint, and MORE II and 3.0.

Genigraphics. Another of the old-time dedicated slide-making companies, Genigraphics has moved gracefully into desktop slide making. A Genigraphics printer driver comes bundled with PowerPoint, but for $45 (refundable with a slide order), you can buy a "generic" version that works with every Mac presentation package. This driver includes a useful preview utility called GeniPeek, which shows you the film-recorder version of your slide (not an approximation of it created by your presentation software). GeniPeek is not included with the PowerPoint package, but you can use it (and the generic driver) with PowerPoint as well as with other programs. All Genigraphics network imaging centers are served by a toll-free modem line ([800] 441-4364), which routes your files to Genigraphics' Memphis facility.

Management Graphics. Before the Mac had color, one of the few relatively easy ways to make 35mm slides was with Management Graphics' EasySlider, which let users translate and add color to PICT files. Today's Management Graphics-based imaging centers (they're all independent) may offer EasySlider II or RIPit!, a custom version of Freedom of Press Professional. RIPit! allows a Solitaire film recorder to image print-to-disk PostScript files, including PostScript graphics and any Type 1 fonts.

Visual Business Systems (VBS). This British vendor of PC-based slide-production workstations also sells its Output Manager Professional to imaging centers, which lets them image Mac PICT or Scrapbook files on Solitaire film recorders. VBS also markets Visual Business Systems No. 5, a Mac charting program designed for 35mm slides.

PostScript Is Coming

Users are clamoring for PostScript slide-imaging systems. It's not that PostScript slides are necessarily of much higher quality than others, but PostScript does have several advantages. First, it lets you make use of the precision and flexibility of sophisticated graphics programs such as PageMaker, FreeHand, QuarkXPress, Illustrator, and Photoshop. In addition, any PostScript fonts that work with LaserWriters, imagesetters, or other PostScript output devices can work with film recorders.

There are also disadvantages to PostScript slide making. A PostScript file of a slide may be larger than the same slide output as a PICT file, with little or no discernible quality advantage. With PostScript (as with PICT), each slide becomes a separate file, which makes your presentation hard to keep track of if it has more than a few slides. Using the Autographix or Genigraphics driver, or making a Scrapbook, makes it easier to control large slide shows. If you don't need special fonts or intricate drawings, PostScript may not be the right solution for your slide show.

Film recorders are not PostScript imaging devices any

more than Linotronic imagesetters are. Each type of output device has its own language and must have your PostScript document interpreted or translated — RIPed (raster-image processed) — before it can create a hard copy. There are several techniques for interpreting PostScript for film recorders. Adobe's new Emerald RIP is one solution, although manufacturers will have to incorporate it into their film recorders. Most of the solutions are software — VBS' Output Manager Professional, Custom Applications' Freedom of Press for the PC, and Management Graphics' RIPit! are available for imaging centers. Freedom of Press Professional for the Mac, which works with film recorders and other output devices, should be available this fall.

Tricks of the Trade

Once you have your presentation software and have chosen a slide-imaging service, there are still a few hurdles to cross before your completed slide show is in your hands. The following tips can help you sail through the process:

• **Use a color monitor.** If you have a color monitor and a monochrome monitor, boot your Mac with the color one.

• **Select the printer driver before creating slides.** If your software includes a special driver for writing slide files to disk, always go to the Chooser and select it before launching the program. Converting from another format is always more difficult than working in slide format from the outset.

• **Avoid side-to-side or diagonal blends.** Film recorders are raster devices, which write images in horizontal lines. Although your presentation software may make it easy for you to create ramps of graduated color that change in intensity from left to right or even diagonally, the film recorder can take a long time to image such a slide. A ramp that changes from top to bottom, on the other hand, can run efficiently. (This doesn't mean you can't have a diagonal blend if you need it, just that it carries a price — literally, if your service bureau charges extra for slides that take more than a minute or two to image.)

• **Control your fonts.** The only way you can use fonts other than the 11 that are resident in the LaserWriter Plus is to print PostScript to disk and have the files translated to film-recorder format by one of the PostScript interpreters (such as RIPit!, VBS Output Manager Professional, or Freedom of Press Professional). This means you cannot use the Adobe equivalents of the LaserWriter fonts (or any of the named styles) under most circumstances (see the "Using Fonts in Slides" sidebar).

• **Test your files before running an important job.** Create a small file containing the types of slides you normally use — word slides, pie charts, diagrams, and so on — and send them to any imaging center you're thinking of using. This is also a good way to determine which format you prefer to work with.

• **Double-check every slide just before exporting your files.** More mysterious shifts in type and other elements seem to occur with presentations than with other types of files. Sometimes PICT files fly apart when you ungroup them in a presentation program — files from Canvas and DeltaGraph seem particularly prone to this. If you must rearrange the elements, reassemble and regroup them; check the slide before processing just to be safe.

Future Perfect

Only a few years ago, creating a slide show was a big (and very expensive) deal. We've come a long, long way. True, it can be confusing in the beginning, as you struggle to find an imaging center you can work with (possibly the most important decision in the entire process), learn new software, and solve all the little problems that inevitably accompany new undertakings. But after a couple of slide shows, you'll wonder what all the fuss was about.

Kathleen Tinkel is a Connecticut-based graphic designer who writes frequently about computers and design. She is copublisher of *MacPrePress*, a weekly faxed newsletter.

Directory

Slide-Making Software

CA-Cricket Presents
Computer Associates International, Inc.
1240 McKay Drive
San Jose, CA 95131
(800) 531-5236
$495

MORE 3.0
Symantec Corp.
10201 Torre Ave.
Cupertino, CA 95014-2132
(408) 253-9600
$395

Persuasion 2.0
Aldus Corp.
411 First Ave. S.
Seattle, WA 98104
(206) 622-5500
$495

PowerPoint 2.01
Microsoft Corp.
One Microsoft Way
Redmond, WA 98052-6399
(206) 882-8080
$395

StandOut!
Letraset USA
40 Eisenhower Drive
Paramus, NJ 07653
(201) 845-6100
$295

Slide-Imaging Centers

Autographix, Inc.
100 Fifth Ave.
Waltham, MA 02154
(800) 548-8558
(617) 890-8558

Dicomed
DuPont & Fujifilm Electronic Imaging Co.
11401 Rupp Drive
Burnsville, MN 55337
(800) 888-7979

Genigraphics Corp.
2 Corporate Drive, Suite 340
Shelton, CT 06484
(800) 638-7348

Management Graphics MGI
1401 E. 79th St., #6
Minneapolis, MN 55425
(612) 854-1220

Visual Business Systems
380 Interstate N., Suite 190
Atlanta, GA 30339
(404) 956-0325



By Howard Bornstein

RUNNING THE SHOW

With the right accessories, turning your Mac's screen into the silver screen can be a breeze.



Figure 1: Using LCD projection panels is one of the most convenient and cost-effective methods for giving a presentation. These panels behave like electronic transparencies, letting you use an overhead projector to display your Mac screen. LCD panels were originally available only in monochrome, but some of today's models can display many of the colors on your Mac screen.

You've put together a slick presentation and it looks great on your monitor, but now you have to find a way to show it to a wider audience. You could turn your images into slides or transparencies, but these have their own constraints — once you've prepared them, it takes time, money, and effort to make changes or corrections. The best solution would be simply to project your Mac screen on the wall so that you'd have all its interactivity at your disposal. Thanks to today's presentation peripherals, you can do just that, and they're turning the Mac into a killer presentation machine.

Video Projection Systems

One way of displaying your Mac screen to an audience is with a video projection system, which displays the Mac's video image on a screen or wall. The Project-A-Mac II color video projectors from PDS Video Technology are examples of such systems. Video projectors have the advantage of displaying a true video image, so you see the same color and motion on the screen that you see on



The ViewFrame II+2 (left) from nView displays your screen in eight shades of gray. The Proxima Data Display MultiMode MacPac from Computer Accessories (center) displays your screen in simulated color. Shades of magenta are mapped to the colors on your screen. The Sayett Datashow HR/M Projection Pad (right), formerly marketed by Kodak, lets you display a slide show from your Mac Plus or SE in eight shades of gray.

your monitor. Unfortunately, these systems are big and expensive (the Project-A-Mac series costs from $14,400 to $22,400), making them impractical for all but the largest — and best-funded — businesses. A newer, cheaper, and more convenient technology is the LCD (liquid-crystal display) panel.

LCD Panels

LCD panels let you use an overhead projector to display what's on your Mac's screen. These panels are similar to the LCD displays installed on laptop computers such as the Macintosh Portable.

LCD panels are a little like electronic transparencies — if you hold one up, you can see through the glass. You plug the panel into a power source, connect it to your Mac, and place it on an overhead projector. Your Mac's screen image is then generated on the LCD panel. When the projector's overhead light passes through the panel, the image on the panel is projected on the wall. (For more about LCD panels, see "Color LCD Technology," February '90, page 230.)

LCD technology is evolving rapidly, and several kinds of panels are now on the market, including panels that can display virtually every color on your screen. The first panels were monochrome, typically blue and white. (These panels are still available — for example, Computer Accessories' Proxima Data Display 342.) True black-and-white panels are also available, and these work well with the crisp black-and-white Mac screen. At a cost of about $1,500, monochrome panels are the least expensive LCD panels you can buy.

Gray-scale panels add another layer of sophistication to presentations by letting you make better use of your monitor's color or gray-scale capabilities. These panels assign each color in your presentation a shade of gray or a geometric monochrome pattern, such as cross-hatching or diagonal lines. The Apollo PC 9600, for example, assigns eight geometric patterns, similar to the black-and-white patterns in the MacPaint palette, to the colors on your screen. Other panels, such as the nView ViewFrame II+2, convert colors into eight or more shades of gray.

Gray-scale panels range in price from $1,500 to about $4,500, depending on the number of shades and other features available. They are a useful and effective means of displaying your presentation, but if you want to use color, clearly shades of gray won't do. Fortunately, there's been an explosion of color in the LCD market, and you can now create slick color presentations — just what you need to show your company's transition from the red to the black.

There are two kinds of color LCD panels: simulated color and true color. Simulated-color panels, such as the Proxima Data Display MultiMode from Computer Accessories, convert the colors on your Mac screen to a range of yellows, oranges, browns, and purples. For between $2,000 and $3,000, you get colors that are differentiated from each other but that bear no (or little) relation to the actual colors on your Mac screen.

Simulated-color panels were the forerunners of true-color panels, which let you display the same colors as those that appear on-screen. True-color panels are the most expensive LCD panels you can buy — depending on the number of colors available, they cost between $5,000



Figure 2: Remote-control devices let you give your presentation without spending all your time at the Mac keyboard. These devices can automate a range of features, from basic mouse clicks and menu commands to complex programmed keyboard sequences.

From left to right: On-Command from Computer Support, Remote Keyboard from Forté Communications, Smart Remote from Sayett Technology, and SilentPartner from Presentation Electronics.

and $6,500. At the low end of the price scale are products such as the 480C PC Viewer from In Focus Systems, which displays eight colors (red, blue, green, cyan, magenta, yellow, black, and white). At the high end you find another In Focus product, the recently announced 5000CX panel, which offers a palette of 4,913 colors (adequate for accurately displaying a color slide or photograph). Computer Accessories and nView also market true-color panels.

Color LCD is the wave of the future. We'll soon be seeing this technology not only in niche products such as LCD projection panels but also in portable televisions and Mac monitors.

LCD panels do have one drawback: Unlike projection systems, they don't have the same refresh rate as monitors do. A monitor updates the screen image 60 to 80 times a second, and although an LCD panel's electronics have no trouble keeping up with this, the panel itself has a refresh rate of only four to five frames per second. As a result, the cursor isn't always visible if you move it quickly across the screen, and it's not practical to try to show presentations that include elaborate animated sequences — physically, the panel just can't keep up.

Panel Pros and Cons

LCD panels do have several advantages as presentation platforms. Even their slow refresh rate has a benefit — you can use it to produce attractive fades between images. Several models give you the option of loading your presentation directly into the LCD panel, so you don't even need a Mac for your presentation, just the LCD panel and an overhead projector. For example, In Focus Systems' Liteshow II (which should be available in October) is a true-color LCD panel that lets you save your presentation on-disk so it can be loaded into the panel. You can reorganize the material without going back to your Mac and add special effects, such as wipes, dissolves, and fades. In Focus also has an optional storage module, called the PresentationModule, for its PC Viewer series that can store 50 or more gray-scale screens. The Apollo PC-9800 can store 50 or more gray-scale images on its built-in 2-inch floppy disk.

If you don't like the hassle of hooking up your panel to an overhead projector, Dukane's MagniView 800 VGA Multisync Data Projector combines an overhead projector with a simulated-color LCD panel. At a cost of $1,895, this is a reasonably priced product for streamlining your presentation.

A variation on the LCD panel is the Looking Glass Light Writer from Chisholm. The Looking Glass is an LCD panel that can display up to 30 simulated colors; the Light Writer is a graphics tablet. With this combination, you can project an image with the LCD panel and then annotate it by drawing on the graphics tablet. Your drawings are displayed on the panel over the screen image.

Before you spring for an LCD panel, there are a few things to consider. First, how will you connect it to your Mac? You may need to purchase a special adapter in order to use the panel with your Mac. These adapters can add up to $250 to a panel's list price. Panels that work with the Mac II series plug into a video card; most come with a cable that lets you view the image on the monitor as well. The closed Mac systems — the Plus, the SE, and the



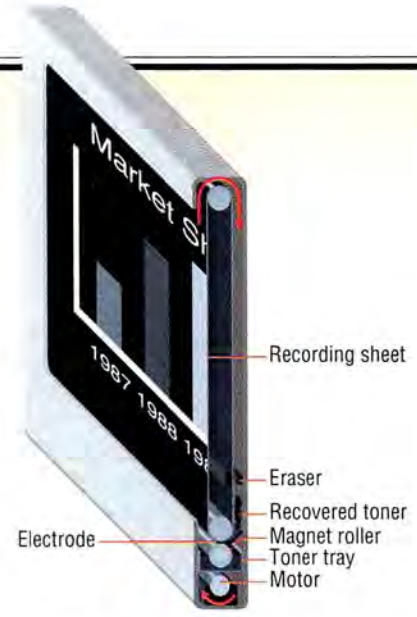


The Information Station

The presentation market has spawned some interesting innovations. Applied Resources recently introduced the Information Station, a floor-standing device that has a 24-x-34-inch vertical display area. This $15,000 unit operates a little like a paperless printer: Screen images from your computer are translated into monochrome TIFF files, which the Information Station "prints" by electrostatically applying magnetic toner to a white Mylar film loop. The image is printed on the loop as it scrolls up within the display area; it's erased when the loop scrolls behind the unit.

The Information Station's image size is 1,680 dots by 2,391 lines, with a resolution of more than 70 dpi. It can create a full screen, even with halftones, in about nine seconds.

Currently, only an interface for DOS machines exists. Applied Resources had not announced a Mac product at press time, but you'll probably see such a product in the near future. For more information, contact Applied Resources, Inc., 220 Van Eyck, 7007 College Blvd., Overland Park, KS 66211; (800) 826-7963 or (913) 469-9191.



SE/30 — require a dealer-installed interface card.

Setting up an LCD panel can be a complex procedure, and unfortunately, the documentation included with many products is poorly written or confusing. Many LCD panel users work in sales, marketing, or finance, so it's ironic that the products are often designed and documented as though they were meant for engineers. The vendors show a surprising lack of attention to the intended audience for their products.

If you will be traveling a lot with an LCD panel, look carefully at the box it comes in. Although the panels are reasonably sturdy, they do contain glass plates that can break with improper handling or shipping. The LCD panels from nView all come in hard-shell, molded, foam-filled suitcases, perfect for checking as baggage when you fly. You should transport all other panels as carry-on luggage.

Remote Controls

Your presentation uses graphics, stereo sound, and some sexy animation. Great stuff, but don't forget this is *your* presentation: You, not your Excel chart, are the star of this show. The last thing you want is to be stuck behind your Mac feverishly punching in commands. What you need is a remote control, which lets you run the presentation *and* stay in the limelight.

You're in luck — there's a new crop of remote-control devices designed to let you perform basic keyboard and mouse functions while you walk around and away from the Mac. They use an infrared beam to send their signals, as a TV remote-control unit does, and they have a range of about 30 feet.

You can perform typical functions such as moving the cursor on-screen, clicking or double-clicking on mouse buttons, and selecting menu items. You can program some of these devices to perform a sequence of steps with one click, or they can work with existing macro programs such as QuicKeys or MacroMaker to perform several operations with a single click. Most presentations can run with only simple clicks or keystrokes, so remote-control devices let you get your presentation moving while leaving you free to make the most of your presentation.

The simplest type of remote control has a useful group of built-in keyboard and mouse functions. For example, Forté's Remote Keyboard comes with a good selection of general-purpose keyboard and mouse actions. Nine mouse keys let you move the mouse pointer horizontally, vertically, or diagonally as well as perform a mouse click. Ten keys are dedicated to common menu items — New,

Directory

A variety of Mac presentation peripherals to suit most needs and budgets is available. Here's a guide.

PROJECTION DISPLAY SYSTEMS

PDS Video Technology, Inc.
31566 Railroad Canyon Road
Canyon Lake, CA 92380
(714) 244-3521
Project-A-Mac II ECP 3000, $14,400
Project-A-Mac II ECP 4000, $22,400

LCD PANELS

Apollo Audio Visual
60 Trade Zone Court
Ronkonkoma, NY 11779
(516) 467-8033
PC-9600, $1,698 (8 grays)
PC-9700, $2,748 (28 grays)
PC-9800, $3,995 (28 grays, on-board memory)

Chisholm
910 Campisi Way
Campbell, CA 95008
(408) 559-1111
Looking Glass 480 Mac II, $1,895
Looking Glass 480 Mac, $1,995
Looking Glass Light Writer, $2,815 (includes graphics tablet)

Computer Accessories Corp.
6610 Nancy Ridge Drive
San Diego, CA 92121
(800) 582-2580
(800) 582-0852 (in CA)
Proxima Data Display 342, $1,599 (monochrome)
Proxima Data Display MultiMode, $2,199 (simulated color)
Proxima Data Display MultiMode

Open, Close, Print, Quit, Undo, Cut, Copy, Paste, and Select All — and there are also keys for Return, Delete, Tab, and the space character. Through a Shift function, the device's entire keyboard is remapped to produce the alphabet and the ten digits. Finally, the keyboard has four cursor-control keys and six user-assignable function keys. These generate the codes used by F5 through F10 on the extended keyboard, and you can use them with macro programs to perform user-defined actions.

With a more complex remote-control device, you can redefine virtually every key on the remote keyboard to generate a mouse or keyboard action. Computer Support's On-Command and Sayett Technology's Smart Remote let you reassign 28 keys to any keystroke or mouse movement. With On-Command, once you have redefined a key set, you can save the set to a file.

SilentPartner from Presentation Electronics has expanded capabilities for redefining the remote keyboard. You can define three sets of key meanings and switch between them while running the presentation. These sets give you up to 60 active keys per presentation.

Controlling Factors

If you move the cursor with a remote control during your presentations, you'll notice that it has a different feel from a regular mouse or trackball. With a remote control, you move the cursor by holding down a button: When the button is down, the cursor moves; when you release the button, the cursor stops. It's pretty easy to miss or overshoot the target, because you don't directly control the movement as you do with a regular mouse. On-Command lets you configure the way the cursor keys move the cursor, making it by far the easiest and most accurate remote control to use.

Remote-control devices can be complex to operate, because they are designed to perform many functions with a limited number of keys. You must use special modes and shifted functions to perform all the operations, so they can be difficult and awkward for complicated procedures. Most remote-control devices come with some kind of programmability: Some simply generate a character when you press a button; others perform entire macro sequences. Unfortunately, they're almost all awkward or difficult to program. Sayett's Smart Remote uses a complex system of LED lights to program the remote. SilentPartner and On-Command use Mac software to change their key assignments.

The macro capabilities of these devices are relatively limited, so you're probably better off creating automated sequences with an application such as QuicKeys from CE Software or Hot Keys from K.I.S.S. (Keep It Simple Software). You can then use a simple remote-control device to implement these commands. This solution is simpler and more powerful than relying on the macro facilities of the more complex remote controls.

Presentation Power

Despite their limitations, LCD panels and remote controls give you the tools to express your own compositions with all the interactivity and power of your Mac. The LCD panel lets your computer strut its stuff, and the remote control lets you express yourself without being hunched behind the computer. Combine these peripherals with software such as HyperCard, SuperCard, and MacroMind Director, and you can put together a presentation machine that will knock 'em out in any boardroom in America.

Howard Bornstein is a Mac journalist and the author of *Turn and Burn: The Authoritative Guide to Falcon*, published by COMPUTE! Books.

MacPac, $2,299 (simulated color)
Proxima Data Display VersaColor Mac II series, $6,499 (512 true colors)

Dukane Corp.
2900 Dukane Drive
St. Charles, IL 60174
(800) 634-2800
MagniView 342, $1,395 (monochrome)
MagniView 480, $2,199 (simulated color)
MagniView 800 VGA Multisync Data Projector, $1,895

In Focus Systems, Inc.
7770 S. W. Mohawk St.
Tualatin, OR 97062
(800) 327-7231
480GS PC Viewer, $1,655 (8 grays)
480C PC Viewer, $4,795 (8 true colors)
480CX Mac II series, $5,495 (64 true colors)
5000CX, $6,495 (4,913 true colors)
Liteshow II, less than $2,000
PresentationModule, $1,595

Nutmeg Systems, Inc.
25 South Ave.
New Canaan, CT 06840
(800) 777-8439
LCD Interface to Sayett Datashow HR/M, $499 (Mac II series)

nView Corp.
11835 Canon Blvd.
Newport News, VA 23606
(800) 736-8439
(804) 873-1354 (in VA)
ViewFrame II+2, $1,995 (8 grays)
ViewFrame RGB, $3,995 (16 true colors)

Sayett Technology, Inc.
100 Kings Highway, Suite 1800
Rochester, NY 14617
(800) 836-7730
Datashow 480, $1,895 (larger screen size)
Datashow HR/M, $1,395 (monochrome)
Datashow HR/MP, $1,695 (monochrome)

Sharp Electronics Corp.
Sharp Plaza
Mahwah, NJ 07430-2135
(201) 529-8731
QA-75, $1,795 (16 grays)

REMOTE-CONTROL DEVICES
Computer Support Corp.
15926 Midway Road
Dallas, TX 75244
(214) 661-8960
On-Command, $295

Forté Communications, Inc.
1050 E. Duane Ave., Suite J
Sunnyvale, CA 94086
(408) 733-5100
Remote Keyboard, $395

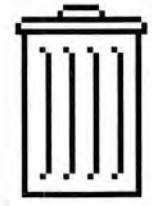
Presentation Electronics, Inc.
4320 Anthony Court, #8
Rocklin, CA 95677
(800) 888-9281
SilentPartner, $399

Sayett Technology, Inc.
100 Kings Highway, Suite 1800
Rochester, NY 14617
(800) 836-7730
Smart Remote, $325

Once you put MiniCad+ on your desktop...



All your other CAD software will go here.



There are a lot of contenders—and pretenders—coming into the Macintosh market with so-called "full-featured" CAD programs. But there's one program these imitators won't compare to: MiniCad+. It set the standard for all Mac CAD programs when it was introduced in 1986, and continues to set the pace in Macintosh-aided design.

Discover Our Dimensions

MiniCad+ is an award-winning 2D/3D package. Whether you're designing a house or high-tech mousetrap, you'll find the precision you need.

Smarter than the Average Mouse

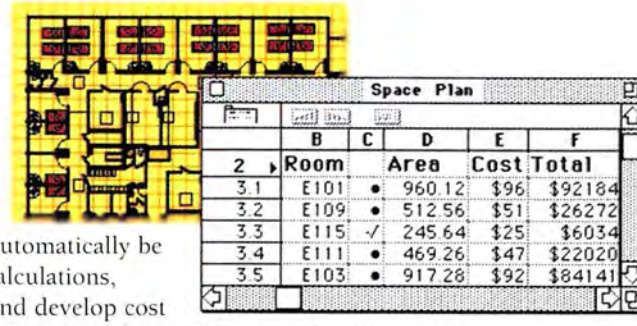
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2	Room		Area	Cost	Total
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3.2	E109	•	512.56	$51	$26272
3.3	E115	√	245.64	$25	$6034
3.4	E111	•	469.26	$47	$22020
3.5	E103	•	917.28	$92	$84141

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A Digital Portrait Montage

Here's how to create a montage of scanned and modified photos with the embossed look of a relief.

1. The Finished Montage



The completed image contains figures isolated from several photos and has the embossed look of a bas-relief.

Using childhood photographs, designer Jack Davis has created a series of self-portrait montages. Instead of turning to traditional photographic techniques, however, he produced the montages on a Mac II with image-editing programs such as Photoshop, PhotoMac, and Studio/8. For the embossed self-portrait shown in Figure 1, Davis used ImageStudio 1.5 and its new Effects modules. This project could be similarly executed in the programs mentioned above or in Digital Darkroom.

A photo of a running boy provided an overall background and frame. To give the figure a sense of movement, Davis silhouetted it in a second document and pasted it back into the original twice. The copies were resized, rotated, and rendered semitransparent. Two other figures were also silhouetted and pasted into place. Using ImageStudio's Relief effect, Davis transformed the finished montage into an image with the classical refinement of a carefully carved bas-relief on plaster or stone.

Verbum: The Journal of Personal Computer Aesthetics **can be reached at Box 15439, San Diego, CA 92115; (619) 233-9977.**

By the editors of *Verbum* magazine



2. Gathering Photo Sources

The original images are three photographs of the artist as a boy. The photos are scanned as TIFF files and opened in ImageStudio, where their contrast and brightness is increased.

3. Painting Out the Sky



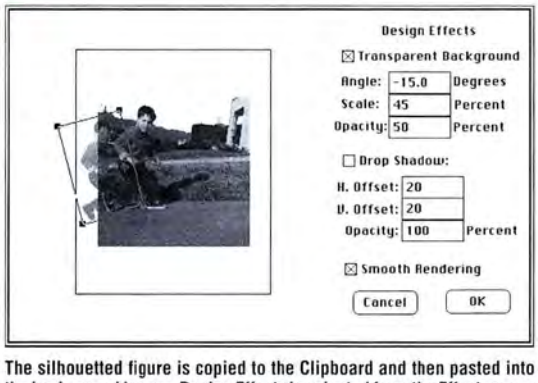
A small square snapshot of a running boy provides the background. To add drama to the image, the sky is painted out. The unwanted pixels are eliminated using three tools: the lasso for large areas, the eraser for smaller chunks, and the paintbrush for fine details.

4. Silhouetting the Figure



To silhouette the running boy, the image is first resaved as a new document. Then the boy is carefully separated from the background, using the paintbrush. The tool's default anti-aliasing mode provides a smooth transition of gray values along the figure's edges. Once the boy has been extricated, the entire background is removed with the lasso and the eraser.

5. Adding a Transparent Copy



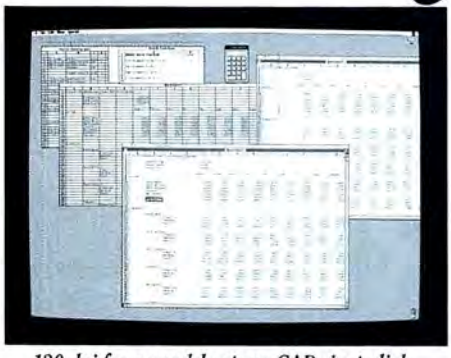
The silhouetted figure is copied to the Clipboard and then pasted into the background image. Design Effects is selected from the Effects menu and is used to rotate the pasted figure slightly, reduce it in size, and render it 50 percent opaque. The dialog box shows a preview of the existing image, along with the newly added figure. Position, angle, and size can be adjusted either by moving the selection box around the figure or by specifying numbers in the parameter fields.

6. Adding More Figures

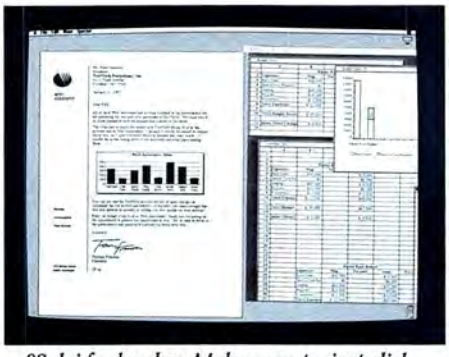


Another transparent copy of the running boy is added to complete the effect of movement. Then a boy from another photograph is silhouetted, copied to the Clipboard, pasted into the background, and positioned. A shadow is created beneath the new figure by selecting the appropriate area with the lasso and decreasing the brightness.

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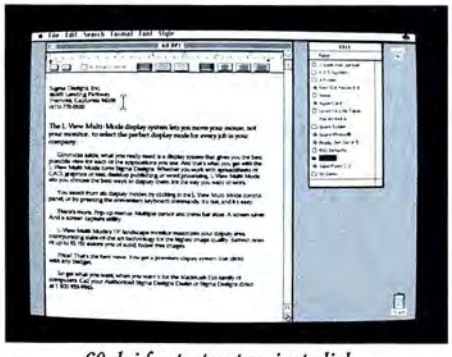
120 dpi for spreadsheets or CAD- just click.



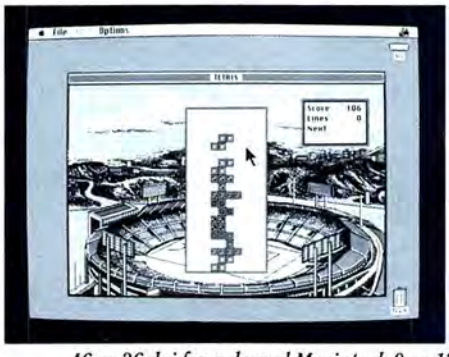
92 dpi for legal or A4 documents- just click.



72 dpi for True WYSIWYG layouts- just click.



60 dpi for text entry- just click.





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7. Joining the Figure and Background

The pasted figure has a "halo" of light tones left over from the silhouetting process. To meld the figure more seamlessly with the background, the halo is carefully eliminated by drawing along the light areas with a small brush loaded with a gray selected from the adjacent background. Selecting Only on Lighter Shades in the Paintbrush Shading Preferences dialog box ensures that only pixels lighter than the selected gray are changed.



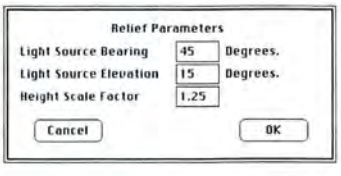
8. Flipping a Figure

A third figure of a boy is silhouetted from its scanned image and pasted into the background. This figure is turned upside down using the Flip Vertical command, and its shadow is drawn by eye using the same technique as in Figure 6. The montage is now complete.



9. Creating a Relief

The entire image is selected and modified with ImageStudio's Relief effect. The Light Source Bearing and Light Source Elevation are set to 45 and 15 degrees, respectively, to simulate a light shining from the upper left and slightly above the image. The Height Scale Factor determines how deeply etched the relief will be.



Toolbox



Hardware: Mac II with 5 megabytes of RAM and 100-megabyte hard-disk drive, Microtek gray-scale scanner, LaserWriter IINTX (for proofing).
Software: ImageStudio 1.5 with Effects modules. (The Effects modules are bundled with ImageStudio 1.5. For registered users of earlier versions, the modules are either free or $99, depending on when ImageStudio was purchased. Contact Letraset for details.)



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Prepress: The OPI Option

The Open Prepress Interface may help streamline the transmission of TIFF images from design to prepress.

By Keith Baumann and Aileen Abernathy

When it comes to top-quality color publications, Mac-based publishing is not yet ready for prime time. The Mac *can* be an integral part of the publishing process, however, thanks to the recent introduction of links to high-end prepress systems such as those from Scitex, Crosfield, and Hell. These prepress links let you create a publication on the Mac and then transmit it to a prepress house, where the publication is merged with high-quality scanned color photographs and color-separated to film.

Of course, the process isn't really as simple as it sounds, and there are pitfalls such as the processing of color photographs. Designers can place, rotate, and crop low-resolution scanned images on the Mac, but the entire process must be duplicated on the prepress end, when console operators manipulate high-resolution versions of the photographs. This duplication of effort adds time and money to the production process.

Aldus, the creator of desktop publishing, hopes its Open Prepress Interface (OPI) will overcome this obstacle. Introduced in March 1989, OPI is actually nothing more than a standard method for describing the placement, scaling, cropping, and color of TIFF images. (TIFF, the standard file format for scanned images, is also an Aldus invention.) When a page layout is saved to disk, OPI comments are embedded in the PostScript code and passed along to the prepress system, which uses them to automate the process of replacing low-resolution scanned images with their high-resolution counterparts. This technique, often called *electronic stripping*, theoretically should save you costly console time at the prepress shop.

To show you how OPI fits into the design-to-prepress operation, here's a short overview of the process. A prepress shop scans color photographs and creates two versions: low-resolution TIFF images for designers to use in laying out the pages, and high-resolution images that are stored in the prepress system for later use. Using a Mac, designers incorporate the low-resolution scans into the page layout, adjusting them to meet their needs. When the completed layout is saved to disk, OPI comments are generated automatically.

The file is then sent to a prepress shop, where a RIP (raster image processor) translates the PostScript file into the prepress system's proprietary format. If OPI is not being used, prepress operators must manually insert the high-resolution color scans and duplicate the designers' cropping, scaling, and positioning. With OPI in place, however, the prepress system can automatically perform all the image replacements and adjustments. The embedded OPI comments tell the prepress system which files to find, where to place them, how to crop and size the images — all the chores console operators would normally have to do. The entire page can then be color-separated and output to film.

In order for OPI to work, it has to be supported both by the page-layout software, which generates the code, and by the prepress system, which must be capable of interpreting the information. Aldus hopes that all software and prepress vendors will support OPI, making it the standard way to convey TIFF data. An OPI standard would have another major advantage: You would be free to use any combination of page-layout software and prepress service, rather than being tied to the exclusive relationships that currently exist between some prepress operations and Mac software developers.

Thus far, OPI has garnered support from several prepress vendors, including Hell, Crosfield, Diadem, Howtek, Kodak, Chelgraph, Screaming Color, and Networked Picture Systems. (At press time, Scitex was a major no-show in this group.) On the Mac side of things, you have access to OPI if you use Aldus PageMaker 3.02 or 4.0 (naturally), QuarkXPress 2.12 or 3.0, Letraset's DesignStudio 1.01 or ColorStudio, or Pre-Press Technologies' SpectreSeps.

OPI sounds great in theory, but it too has drawbacks. For example, OPI works only with TIFF images that are cropped rectangularly. You're out of luck if you want to frame your photograph in a circle, triangle, or polygon. And although OPI lets you rotate an image *and* its frame, you can't rotate just the image *within* the frame. More importantly, logistical problems associated with the OPI work flow could increase your prepress bill. For example, before prepress operators can scan an image, they must know the final output size. This information is required for setting the proper pixel resolution for the scan. It's a classic case of catch-22. The designers don't receive the placement images until the scans are done, and the prepress shop can't perform the scans until the image sizes are set.

Why is it so important to know the image size at scan time? Because most prepress systems aren't very good at resizing continuous-tone images. Image quality suffers, plus scaling and rotation (if required) take an enormous amount of processing time. It's usually much simpler just to rescan the image. Thus, if designers resize or rotate images, they must pay for additional scanning time.

OPI is most practical in situations in which the final image sizes can be determined early in the process and the designers alter only placement and cropping. If you really need the freedom to play with images on-screen, however, try using a desktop color scanner to create your placement images. When you send the file to the prepress shop, include laser-printer output as a placement guide, along with the original transparencies for the high-resolution scans.

The NeXT Cube Almost Gets a Mac Floppy-Disk Drive

MacUser NetWorkShop looks at sharing files between the Mac and the NeXT — using floppy disks.

By Stephan Somogyi and the MacUser NetWorkShop staff

The NeXT computer has lots of impressive features, but its lack of a floppy-disk drive is not one of them. Typically, NeXT machines living in close proximity to each other will be networked together — Ethernet is built in — which makes NeXT-to-NeXT file sharing relatively easy. But what if you want to export a drawing done on the Mac, say in Illustrator, into a FrameMaker document on the NeXT? For Macs that aren't on Ethernet, which is most of them, network transfer is out. You could try begging the NeXT optical read/write drive to read the data off your Mac floppy. But save your breath. Basically, you've got a problem.

Three third-party vendors — Dayna Communications, DIT (Digital Instrumentation Technology), and Pacific Micro — have solutions to this quandary. All three companies make floppy-disk drives for the NeXT that attach to its SCSI bus. All three drives read and write DOS- and UNIX-formatted floppies, and one of them reads Mac floppies as well.

1 Disk, 2 Disk, Black Disk, Blue Disk

Before we launch into the details of the three products, however, we should bring up a rather significant (but perhaps not immediately obvious) point: We're dealing with three operating systems and twice as many floppy-disk formats here. The Mac operating system supports two floppy formats: 800K (the most universal) and the newer 1.4-megabyte high-density drive (FDHD). (There's also the old 400K format for the Mac, but that's all but obsolete.) The UNIX operating system, which the NeXT employs, can also format high-density (1.4-megabyte) floppy drives, but of course, this format is inconsistent with the Mac's 1.4-megabyte format. And then there's DOS, which supports 720K and 1.4-megabyte formats on 3.5-inch floppy disks and a 1.2-megabyte format on 5.25-inch disks. (DOS also has an older 360K format.)

DOS? Why mention DOS in a story about Mac-to-NeXT file transfer? We wish the answer were, "Well, you might want to move files from a DOS machine to the NeXT too." Unfortunately, the real answer is that as of press time, all three products relied heavily on DOS as an intermediate format for moving files from the Mac to the NeXT. With one exception, you have to save your Mac files in DOS format before you can make the transfer.

Does this mean you need to buy a DOS floppy-disk drive for your Mac too? No. AFE (Apple File Exchange), a utility that comes with the Mac's System software,



PHOTOGRAPHY: PETER ALAN GOULD

lets you read, write, and format DOS floppies in the Mac's internal disk drive. This procedure is cumbersome if you do it often, however. AFE is not integrated into the Finder, and it doesn't mount DOS disks on the Mac's desktop. A better solution is Dayna's DOS Mounter INIT ($89.95), which correctly places DOS disks on the desktop. DOS Mounter blurs the distinction between Mac and DOS disks. You can then copy files back and forth between the Mac and DOS-formatted disks by dragging the file's icons in the Finder. With DOS Mounter installed, you only need to use AFE to initialize DOS disks.

Another important point is that none of the NeXT floppy-disk drives reviewed here can read or write 800K Mac floppies. If you're going to move files from the Mac to the NeXT — at least as of press time — you will need a Mac with an FDHD drive.

DaynaFile for NeXT

The DaynaFile for NeXT is a matte black box with an external power supply that houses one or two half-height drives. The DaynaFile is available in three configurations: a single 5.25-inch drive (for 1.2-megabyte disks) for $750, a single 3.5-inch drive (which supports both 720K and 1.4-megabyte disks) for $850, or both drives for $1,105. The 3.5-inch drive is the only one you really need in order to exchange files between a NeXT and a Mac, but if you also want to move files to the NeXT from DOS machines that have 5.25-inch drives, you'll need a DaynaFile.

The DaynaFile for NeXT comes with two NeXT applications: DaynaDOS and DaynaUnix. To install these applications, you have to execute some UNIX shell commands to get the application files onto a local NeXT drive. (This text-based installation procedure is virtually identical for all three drives we reviewed.) Dayna's manual does a particularly good

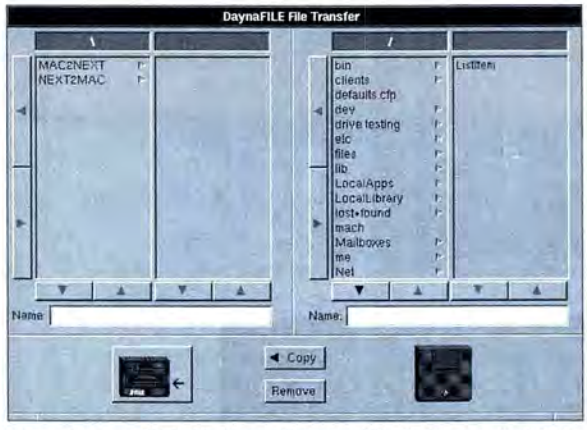


Figure 1: DaynaDOS displays a Browser-like dialog box that lists DOS files on the left and NeXT files on the right.

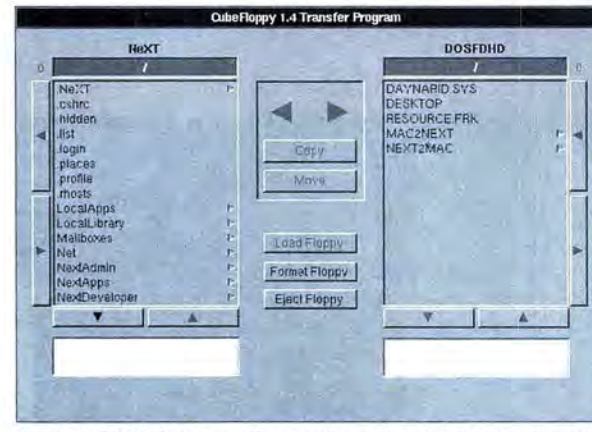


Figure 2: The CubeFloppy file-transfer application lets you format DOS disks as well as copy them.

job of walking you through the process.

The DaynaFile for NeXT can read and write only DOS floppies, and Dayna has no plan to overcome this limitation. Therefore, Mac files must be saved on a DOS-formatted disk before transfer to the NeXT. DaynaDOS is the application that accesses DOS disks. It opens a dialog box that looks a lot like the NeXT's Browser, with one file list displaying the local NeXT file directory and the other the files on the floppy disk (see Figure 1). DaynaDOS provides you with the option of performing rudimentary file translation for PC files, but you don't really need to do this to transfer files between Macs and NeXT machines. In fact, translation corrupts binary file types such as those of Wingz and WriteNow.

DaynaUnix lets you initialize and mount UNIX-formatted floppy disks in the DaynaFile. To exchange floppies between two NeXT machines, each with a DaynaFile, you don't have to use DOS floppies. When the DaynaUnix application is running, it makes UNIX-formatted floppies visible and accessible directly from the NeXT Directory Browser or any NeXT application, just as the DOS Mounter INIT does on the Mac.

MacUSER LABS Table 1: Supported Floppy-Disk Formats

	DaynaFile for NeXT	DIT CubeFloppy 1.4	Pacific Micro PM1.44
DOS 720K	R, W	R, W	R, W
DOS 1.4 MB	R, W	R, W	R, W
DOS 1.2 MB (5.25-inch)	R, W	no	no
UNIX 1.4 MB	R, W	no*	R, W†
Mac 800K	no	no	no
Mac 1.4 MB (FDHD)	no	no	R

R = read
W = write
*Not supported from the graphical interface; must use the UNIX command line
†Cannot read DaynaFile or CubeFloppy UNIX-formatted disks

Table 1: None of the three floppy-disk drives can read or write Mac 800K floppy disks, although the PM1.44 can read Mac FDHD disks. All three can read and write DOS-formatted 3.5-inch 720K and 1.4-megabyte disks and UNIX-formatted 1.4-megabyte disks. Only the DaynaFile can read and write DOS-formatted 5.25-inch 1.2-megabyte floppy disks.

DIT CubeFloppy 1.4

The DIT CubeFloppy 1.4 ($795) is a small black 3.5-inch drive with an external power supply. Its software currently reads and writes only 720K and 1.4-megabyte DOS disks, but read/write support for 1.4-megabyte Mac and UNIX FDHD disks should be available by the time you read this. As it is now, you can initialize, mount, and unmount UNIX floppies in the CubeFloppy via the NeXT's Shell, a command-line interface, but you need some UNIX knowledge to do this. As with the DaynaFile, you need to use the NeXT's Shell to install the CubeFloppy's software onto a local NeXT optical or hard-disk drive. The CubeFloppy's manual explains the steps clearly.

You connect the CubeFloppy with the supplied SCSI cable. But instead of providing an external terminator, DIT has put a small switch on the back of the drive to enable or disable the internal terminator.

The CubeFloppy's software is similar to the DaynaFile's (see Figure 2). It displays a window with two lists, one for local NeXT files and one for the files on the DOS floppy in the CubeFloppy drive. The CubeFloppy software can translate the files that are being transferred. The CubeFloppy program also enables you to format DOS disks, a feature the DaynaFile doesn't offer.

Pacific Micro PM1.44

The Pacific Micro PM1.44 has the most appealing appearance of all three drives: It is matte black and one foot square, so it fits precisely on top of or

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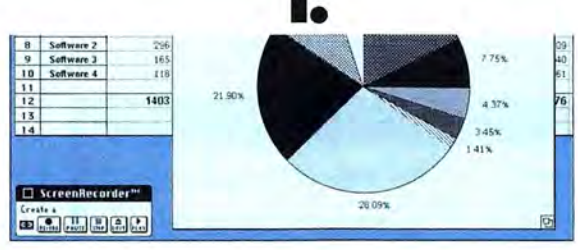
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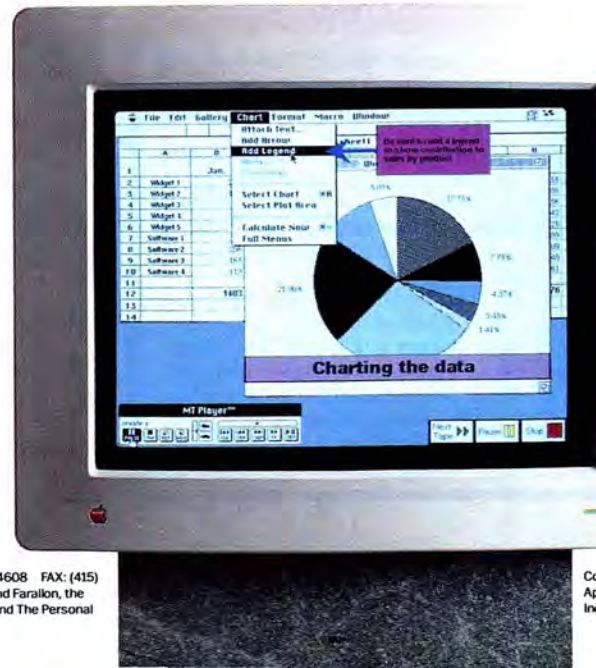
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underneath the NeXT cube. It contains a single 3.5-inch drive, has an internal power supply, and comes with the necessary SCSI cable. At $995, it's the most expensive of the three drives (except for the two-drive configuration of the DaynaFile).

The PM1.44 is the only drive of the three that, at press time, could read Mac-formatted disks directly. It only reads them, however — it can't write to them — and can handle only 1.4-megabyte Mac disks, not the 800K variety.

In addition, the PM1.44 can write as well as read DOS- and UNIX-formatted floppies. There are some limitations here, however. Although its documentation claims it can read and write 720K DOS disks, we consistently had problems when we attempted to do so. As far as UNIX is concerned, it can read only UNIX-formatted disks initialized by a PM1.44; it can't read UNIX floppies initialized by a DaynaFile or a CubeFloppy.

Say What?!

Moving files from one platform to another isn't the only challenge in sharing files between the Mac and the NeXT. Congenial file formats are an equally important part of the process. If applications can't understand your data, file transfer is pointless. Fortunately, Mac and NeXT have several file formats in common. Files from Wingz 1.1, one of the first applications available on both platforms, are completely interchangeable (even when they include charts and draw and text objects) between Mac and NeXT.

The graphics formats supported by the NeXT are TIFF (Tag Image File Format, for scanned images) and EPS (Encapsulated PostScript). Fortunately, most Mac graphics applications support one or both of these formats in addition to the Mac's native PICT format, which the NeXT cannot understand. We were able to move both TIFF and EPS files back and forth between systems successfully. (When saving an EPS file on the Mac for export to the NeXT, you don't need to save it with a PICT preview; the NeXT reads and displays the PostScript directly.)

Two options exist for formatted text documents: WriteNow's file format and RTF (Rich Text Format). The WriteNow word-processing application comes bundled with the NeXT. Most word processors on the Mac can save as and open RTF, WriteNow, or both. MacWrite II even has a specific WriteNow application for the NeXT translator that handles the differences in the NeXT and Mac character sets. WriteNow itself only handles the differences in files that are going from Mac to NeXT, not from NeXT to Mac.

But there can be problems. WriteNow uses font numbers to identify fonts, and the same font can have a different ID number on a Mac than it does on a NeXT (such numbering inconsistencies can also occur between Macs). When font numbers don't match up, text displays in the wrong typeface. RTF has the benefit of identifying fonts by name rather than by number, making it more likely to retain font information correctly.

The Bottom Line

Of the three drives, we liked the **CubeFloppy** ($795) the best. It is the least-expensive 3.5-inch solution and has easy-to-use software. At press time, the CubeFloppy could read, write, and format DOS disks only. By the time you read this, however, it should be able to mount UNIX floppies and read and write Mac FDHD disks as well. The addition of these features will make the CubeFloppy the clear winner.

The DaynaFile for NeXT (3.5-inch drive only, $850; 3.5-inch and 5.25-inch drives, $1,105) was our second pick, even though it doesn't read or write Mac disks (and Dayna has no plans to change this). The DaynaFile for NeXT is an evolution of the DaynaFile for Mac — it's a mature product. For those who want to move files between DOS machines with 5.25-inch floppy-disk drives and the NeXT, as well as between the Mac and the NeXT, DaynaFile provides the only available solution.

The PM1.44 ($995) is more expensive than the other units. It is able to read Mac 1.4-megabyte disks, but this feature may not be worth the extra cost. Its UNIX format isn't compatible with that of the other two drives.

Regardless of which drive you choose, we recommend that you install Dayna's **DOS Mounter** INIT ($89.95) on your Mac, since it provides tremendous functionality for a small price. With DOS Mounter and any of the three drives for the NeXT, you can read from and write to the same floppy from three different platforms.

Capsule Reviews

CubeFloppy 1.4

$3\frac{1}{2}$

The CubeFloppy 1.4 is a 3.5-inch floppy drive that reads DOS 720K and 1.4-megabyte disks. By print time, it should be able to read 1.4-megabyte Mac and UNIX FDHD disks too.

Pros: Very compact unit. Least expensive of the three.

Cons: External power supply. Doesn't read or write Mac-formatted disks.

Manufactured by: Digital Instrumentation Technology, Inc., 901 18th St. #11000, Los Alamos, NM 87544; (505) 662-1482.

List Price: $795.

DaynaFile for NeXT

3

The DaynaFile for NeXT can contain up to two floppy-disk drives; it allows file transfer between DOS disks and the NeXT,as well as creation of NeXT UNIX disks.

Pros: Supports 5.25-inch floppy disks. Comes with coupon for free copy of DOS Mounter.

Cons: External power supply. Doesn't support Mac disks.

Manufactured by: Dayna Communications, 50 S. Main, 5th Floor, Salt Lake City, UT 84144; (801) 531-0600.

List Price: 5.25-inch drive, $750; 3.5-inch drive, $850; both, $1,105.

PM1.44 Floppy Drive

3

The PM1.44 reads and writes DOS-formatted 720K and 1.4-megabyte disks and UNIX 1.4-megabyte disks, and reads Mac 1.4-megabyte (FDHD) disks.

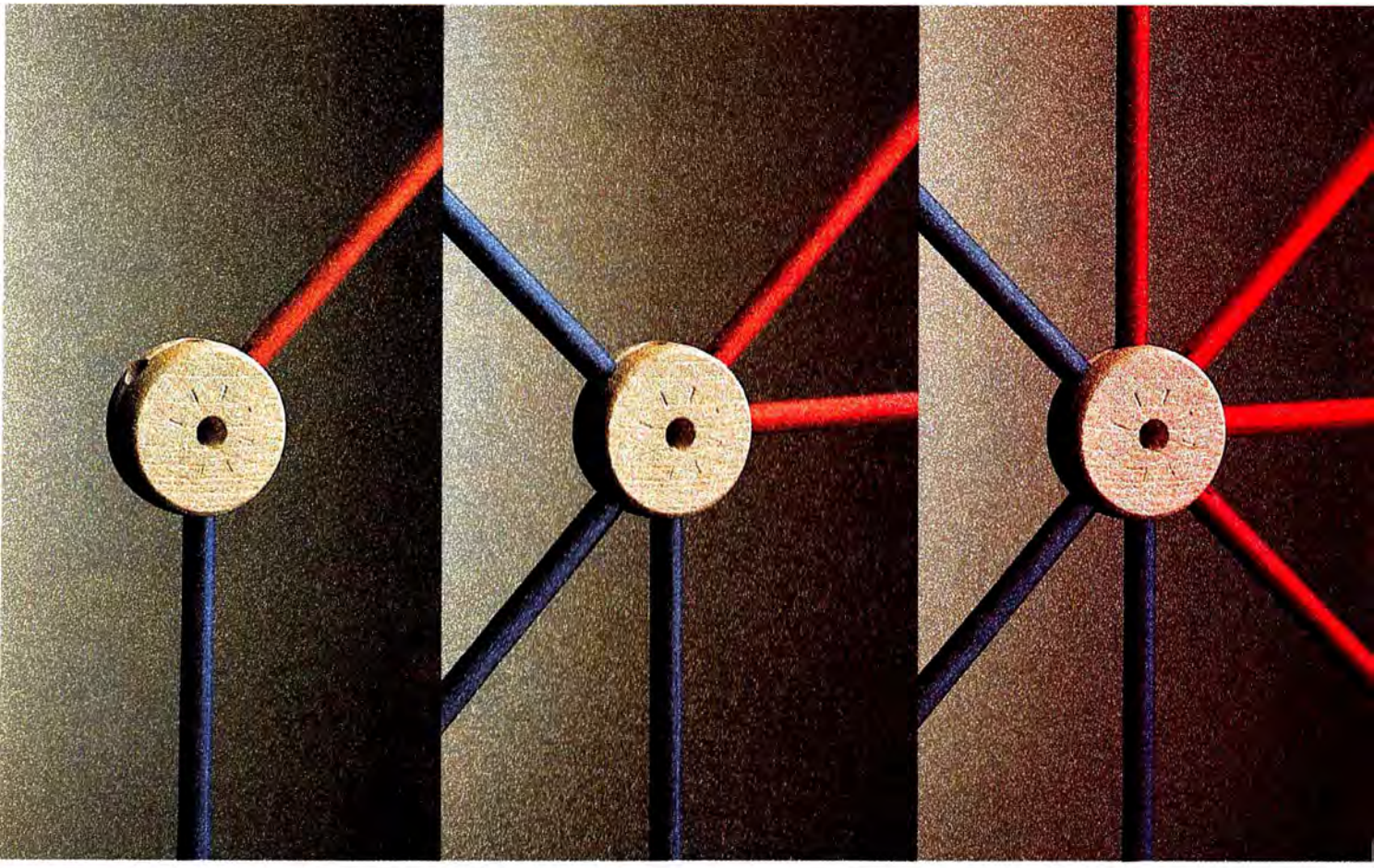
Pros: The only drive that at press time could read Mac disks directly. Fits under or on top of NeXT CPU cube. Integrated power supply.

Cons: Most expensive drive. Didn't work well with 720K DOS disks.

Manufactured by: Pacific Micro, 201 San Antonio Circle, C250, Mountain View, CA 94040; (415) 948-6200.

List Price: $995.

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GROUP TECHNOLOGIES

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Coming Soon to a Mac Near You: ISDN

Everyone's talking about the advantages of ISDN. A few people are doing something about it — and Apple is among them.

By Stephan Somogyi

If you want to talk to someone over the phone and have your Macs communicate via modem, you need two phone lines. Not only that, but the highest data rate you can get out of your modem is 19.2 kbps (kilobits per second) — and you have to pay a premium to get that. Wouldn't it be nice if both you and your Mac could communicate over the same phone line or if you could transfer data to a friend across the country at 64 kbps?

ISDN (Integrated Services Digital Network) will make your dreams come true. Eventually. Already widespread in Europe, ISDN is available in the U.S. only on an experimental (read: expensive) basis. And since no one else has it, even after you paid for it, there wouldn't be anyone else to communicate with.

Although most telephone switches communicate with each other over digital communications lines, most telephone customers connect to their local telephone switches over analog lines (see Figure 1). If you want to send digital data over phone lines, you must first convert it into an analog signal, which is what a modem does. When your Mac is communicating with another Mac via modem, the information you send is converted four times: digital to analog in your modem; analog to digital at your local telephone switch; digital back to analog at the remote telephone switch; and finally, analog-to-digital again in the modem at the other end.

What's worse, analog phone lines are designed with relatively low bandwidth (4 kilohertz), because that's all that's needed to provide their main function — transmitting human voices. When you try to send computer data over these lines, you run into the 19.2-kbps limit. Most people communicate at much lower rates, typically 2,400 bps. And you can't use the same line for voice and data. You either need to alternate or to install two lines, one for each purpose.

2B+D or not 2B+D?

ISDN provides users with a single high-bandwidth digital connection to a local telephone switch. The typical ISDN service provides two *B-channels*, each with a capacity of 64 kbps, and a single *D-channel* with 16 kbps bandwidth. This 2B+D service is called the Basic Rate Interface, or BRI. The B- and D-channels are not physical channels; they are

Figure 1: Voice and Data Transmission via Analog Lines

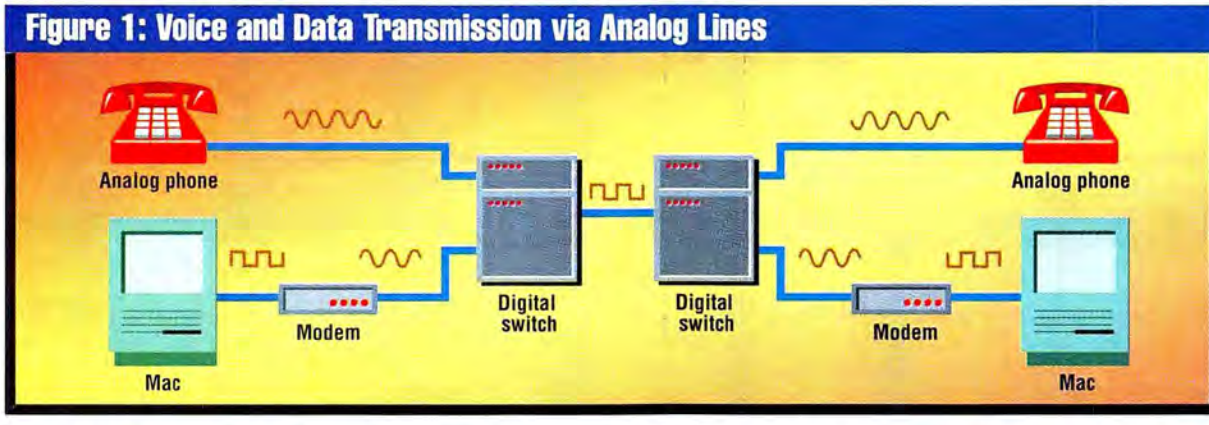


Figure 1: With traditional analog lines, you need two phone connections to communicate voice and data simultaneously. Digital data signals from the Mac must be converted to analog and back to digital many times before arriving at their destination.

Figure 2: Voice and Data Transmission via ISDN Line with an Analog Phone

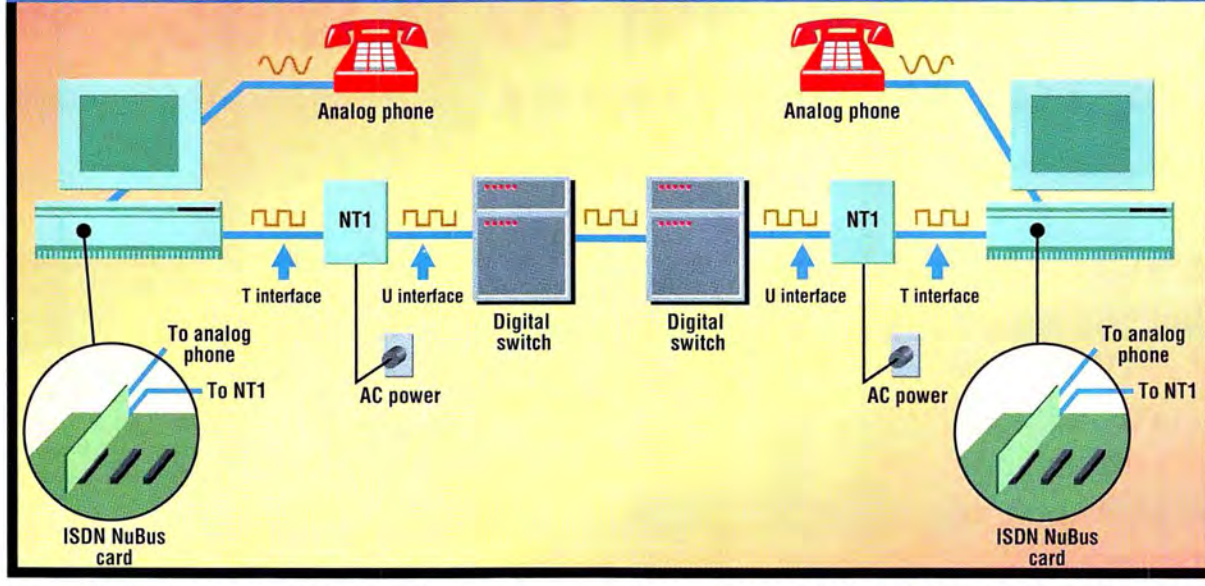


Figure 2: Apple's ISDN NuBus card can be used as ISDN TE (terminal equipment) — you can plug a standard analog phone into it. The NuBus card converts the analog voice signal from the phone into a digital signal, combining it with the digital data from the computer into a single digital bit stream that it sends to the digital switch. The NT1 provides power and the proper interface to the digital switch. At press time, this card was available only to developers.

Figure 3: Voice and Data Transmission via ISDN Line with an ISDN Phone

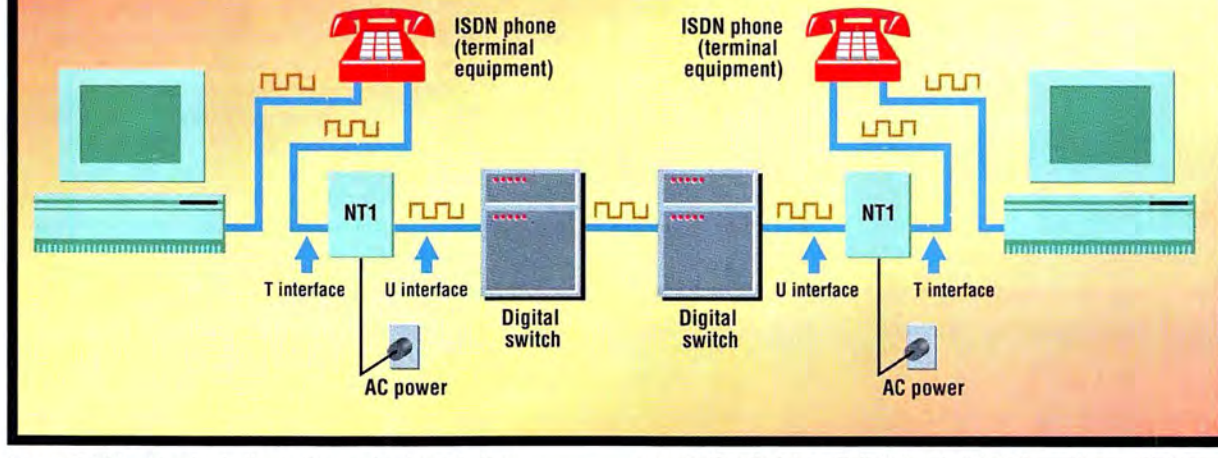


Figure 3: This setup is similar to the one in Figure 2. Here, however, the ISDN phone is the TE. The Mac is connected to it over a standard serial line via the modem port. The phone converts speech directly into a digital signal, which it combines with the signal from the Mac into a single digital bit stream. The NT1 provides power to the ISDN phone.

logical "portions" of the total bandwidth. The B-channels are the primary data carriers. When you place an ISDN call, either voice or data, you're using a B-channel to send and receive. One B-channel is typically used for voice (64 kbps of digital information is approximately the same as 4 kilohertz of analog data); the other is typically used for transmitting computer data. If you've ever waited to complete a long file transfer over a 1,200- or 2,400-bps modem, you'll appreciate what 64 kbps will do for you.

The 16-kbps D-channel is used for call setup and disconnection and for other signaling information. This way, the phone company doesn't have to open a full-bandwidth (64 kbps) connection until the receiving party accepts the call.

Call setup uses only a fraction of the D-channel's bandwidth. The D-channel is





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GMU1

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packet-based — that is, any information traveling on it is compartmentalized into small data packets that contain addressing and packet-sequencing information. This makes the D-channel a good conduit for sending X.25 packets. X.25 is an international standard for transmitting data packets over wide-area networks. When your local ISDN switch receives an X.25 packet on the D-channel, it knows how to route the packet to the appropriate destination.

The B-channels, on the other hand, are open channels from you to the recipient. ISDN doesn't specify a data-packet protocol for them. However, if you have an application, say a communications package, running on computers at each end of an ISDN connection, they can format the data in any protocol, such as Xmodem, that both can understand.

The Hardware

ISDN runs over the same single twisted-pair wire that's currently used for analog lines. The hardware changes needed to support ISDN are twofold: The phone company needs to have ISDN-capable switches, and you need the requisite hardware on your premises.

Figure 2 shows a typical setup. The single twisted pair that comes out of the wall socket goes to an ISDN network terminator (NT1); this is called the U interface. The NT1 requires external power, because with ISDN, the lines from the phone company don't supply power to your local phone equipment. Three wire pairs come from the NT1: one pair each for sending and receiving signals and the third pair for power. The send/receive pairs are called the T interface. The T interface goes from the NT1 to the TE (terminal equipment).

This terminology reflects ISDN's approach to the hardware connecting to the network: Either a computer or an ISDN phone can be a TE. It doesn't really matter — both put out a digital signal. In fact, in an ISDN setup, nearly everything is digital. If you use an ISDN phone as your TE (as in Figure 3), it converts your voice into a digital signal. If you use an ISDN add-on card in your Mac as the TE (as in Figure 2), you plug a standard analog phone into the card, and it does the analog-to-digital conversion. Digital data coming from the computer (one B-channel) is combined with digitally encoded voice data (the second B-channel) and whatever data is being sent over the D-channel into a single digital signal. This is then transmitted to the local telephone switch.

The Software

ISDN's software component is mainly the data that goes over the D-channel: call-setup and call-status information. Unfortunately, though, there isn't a universally accepted standard yet. CCITT, the international committee that sets communications standards for telephony, has produced a detailed specification, but each of the ISDN switches available today implements only a different subset of the total potential feature set. Because of this disparity, ISDN terminal equipment needs to know which type of switch it's communicating with. At press time, Apple's ISDN card could communicate only with AT&T and Northern Telecom ISDN switches, the most common switch types in the United States. Apple's card cannot communicate with a Siemens switch or with NEC or Hitachi switches.

The TE sends information containing the caller ID of both the calling and the receiving parties and the billing-number ID to the switch it's connected to when it sets up a call. The caller ID feature of ISDN sends your phone number along with every call made. If the receiving TE is a telephone, it will display the number; if the receiving TE is a computer, it will look up the number in a database and immediately associate the number with a name. The recipient can then choose whether or not to answer the call. There has been a lot of controversy over the caller ID, and many people oppose ISDN because it provides this feature. But caller ID is only one of ISDN's many features; it is *not* a fundamental part of the whole concept. In fact, part of the ISDN software specification defines a "privacy bit," which blocks the receiving party from seeing the caller ID.

Another ISDN software feature is user-to-user information. Each time a call is set up, the calling party has the option of sending up to 131 bytes of user-defined information along with the standard calling information. If one Mac is calling another, the user-to-user information can contain such things as the name of the application that the receiving Mac needs to run to communicate with the calling Mac, or an instruction to turn on a Mac that is turned off (remember, the ISDN card is powered by the NT1). If, for example, you've set up your home TE to

Glossary

2B+D: This description refers to the ISDN BRI (Basic Rate Interface), which consists of two 64-kbps (kilobit per second) data channels (B-channels) and a single 16-kbps signaling channel (D-channel). These channels are logical; data from all three channels is combined into a single digital data stream before being sent to a telephone switch.

Basic Rate Interface (BRI): The Basic Rate Interface is the smallest unit of ISDN service a phone company provides. The BRI provides two B-channels and a single D-channel.

B-channel: A B-channel is a 64-kbps ISDN communications channel. Once an ISDN connection has been established between two users, all data is exchanged via B-channels.

billing ID: The billing ID is used by the phone company to bill a user for an ISDN call. The difference between a billing ID and a caller ID is that companies with PBXs use a single billing ID but require multiple caller IDs for their PBX-connected users.

caller ID: The caller ID is the phone-number equivalent for ISDN. When setting up an ISDN connection, you provide the caller ID of the party you wish to connect to. More than one caller ID can have the same billing ID.

D-channel: The D-channel is a 16-kbps packetized (formatted) ISDN communications channel. Each data packet contains source and destination addresses. The D-channel is used to transmit ISDN administration information, such as call setup, without tying up a full B-channel. It can also transmit user data in X.25-packet format.

Group 4 fax: Group 4 fax is the facsimile standard for ISDN. The current standard for analog phone lines is Group 3, which uses a V.29 modem communicating at a maximum rate of 9,600 bps over conventional analog lines. Group 4 will use a B-channel running at 64 kbps and will not have the additional overhead of converting the digitally scanned image to analog in the modems at both ends of a connection.

NT1: An NT1 is an ISDN network terminator. The line coming from the phone company plugs into this hardware. The NT1 converts the U interface, the line from the phone company, into the T interface, the wiring that plugs into the ISDN TE. The NT1 must be powered locally, so to guarantee uninterrupted phone service during a power outage, you need to have the NT1 running on a uninterruptible power supply. The NT1 often supplies power to TEs.

PBX: A PBX is a local switching system that is installed on your premises. In the context of ISDN, a PBX is usually connected to a PRI (Primary Rate Interface), and it provides users connected to the PBX with 2B+D service.

Primary Rate Interface (PRI): The Primary Rate Interface consists of 23 (U.S. and Japan) or 30 (Europe) B-channels and one D-channel. PRI is used by businesses. Access to the B-channels is parceled out to various users; the single D-channel provides call setup and disconnection for all users.

privacy bit: The privacy bit causes the receiving switch in an ISDN call to hide the caller ID from the receiving party.

switch: A switch, owned by the phone company, establishes connections between callers and the people or computers they are calling. Switches are connected via high-capacity lines, almost all digital, to other switches. Each ISDN connection goes from a user to a local switch. If users call someone who is connected to a different switch, their local switch establishes a connection to the destination switch, sometimes through one or more intermediate switches. The destination switch then makes the final connection to the called party's line.

terminal equipment (TE): ISDN terminal equipment can be an ISDN phone, a computer with an ISDN interface, or any other device that can communicate via ISDN.

T interface: The T interface is the connection between an NT1 and TE. It consists of two sets of twisted-pair wiring: one for sending, the other for receiving.

trunk: A trunk is a large-capacity line, usually digital, that transmits the data of hundreds or thousands of calls between two switches.

U interface: The U interface is the connection between an ISDN switch and an NT1. It consists of a single set of twisted-pair wiring.

This glossary is dedicated, with thanks, to Ernestine Tomlin.

refuse calls from unknown caller IDs, and you're away on business and calling from a hotel or pay phone, you can include a "Pick up the phone, it's me" message.

Applications

Ultimately, ISDN will come into its own as applications that take full advantage of it become available. The most obvious use is phone management. If your ISDN line goes straight into your Mac and you just plug in a handset to speak and listen, you end up with an extremely intelligent telephone-management system. A simple application might be a dialer/answerer with a database that dials numbers based on name or that accepts calls only from certain caller IDs.

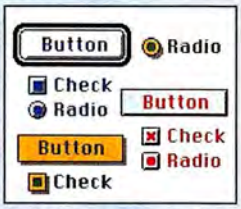
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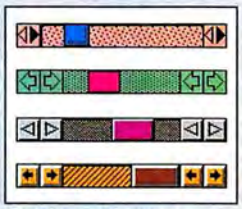
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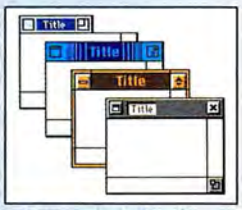
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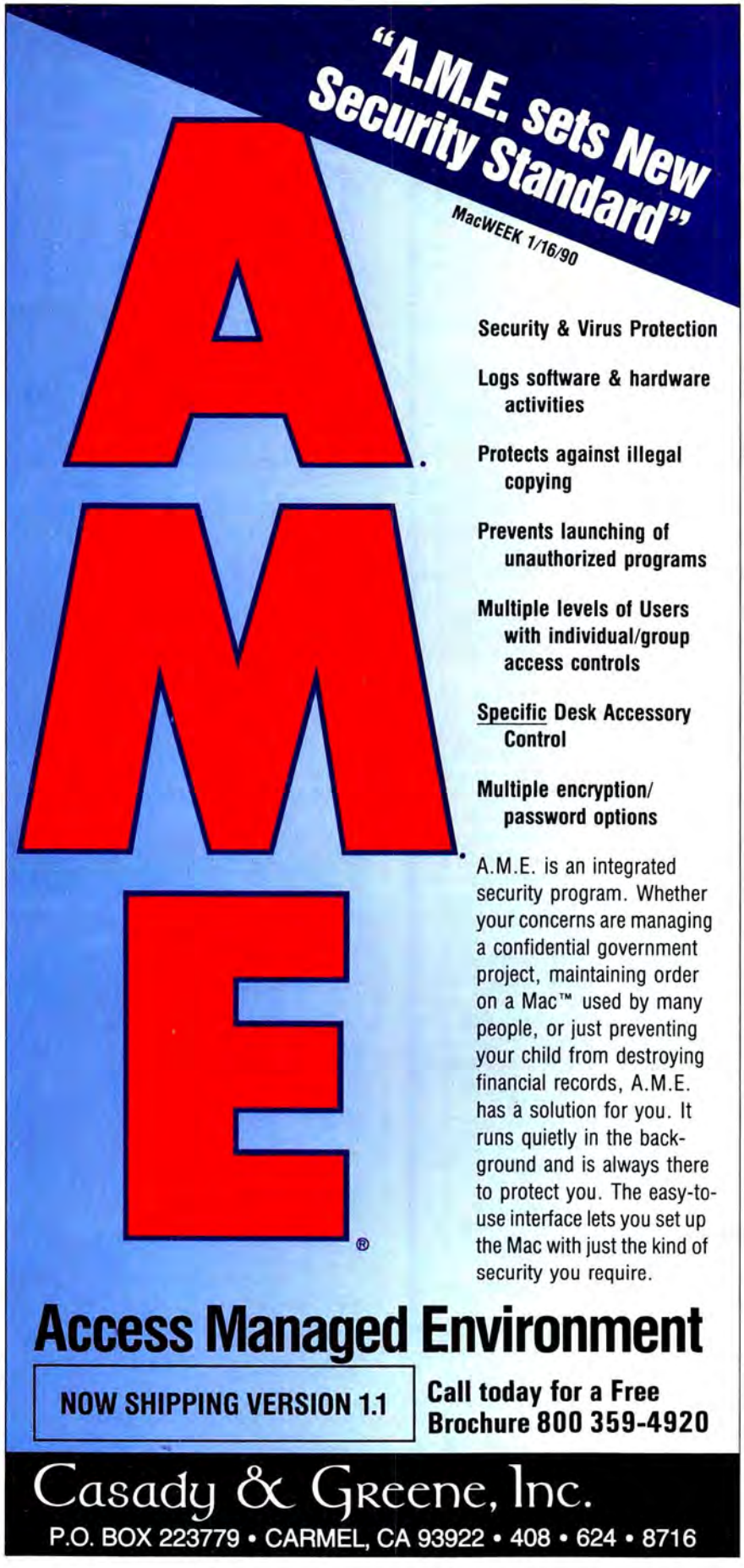
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Another application is one using a simultaneous voice and data connection. Farallon Computing has a development version of its Timbuktu/Remote screen-sharing software that runs over ISDN. With it, you can control another user's Mac via one B-channel and talk via the other — with a single phone connection. With a setup like this, imagine how much easier tech support could become once ISDN is widespread.

The additional bandwidth that ISDN provides is ideal for use with multimedia applications. Sound and video are expensive to transmit by conventional electronic means, because they are so data-intensive. Combining data-compression technology and ISDN's bandwidth will make long-distance desktop video feasible. In fact, any type of data that until now was too great in volume to send over analog lines, even with the high-speed modems available today, will become easily transportable.

Writing applications on the Mac that communicate via ISDN is going to be relatively easy, because Apple is providing Communications Toolbox tools for use with ISDN. The Toolbox provides prepackaged code for making various kinds of telecommunications connections, allowing developers to concentrate on what users do with an application after they get connected (see "Communications Toolbox," September '90, page 295). At this year's Worldwide Developer's Conference, Apple showed a dialer application that had been created in SuperCard and that used XCMDs to make and receive calls via the Apple ISDN card. The XCMDs in this particular demo were specific to Apple's card and won't be made available to the public, but Apple will provide a HyperCard toolkit for the Communications Toolbox.

Users will also appreciate the simplicity that ISDN provides. The typical hassle of talking to modems with AT commands will end with ISDN. And it's going to take much less time to set up and complete an ISDN connection than it takes to set up a connection with modems. Such short connect times mean that you can query a remote database via a quick ISDN call without perceiving any lag. The connection duration can also be kept at a minimum when two computers are talking to each other directly without human interaction. This will also be the case with faxing via ISDN. Currently, Group 3 fax is sent at 9,600 bps; imagine what a

digital 64 kbps connection will do for fax transmission speeds.

Cost, Availability, and Reality

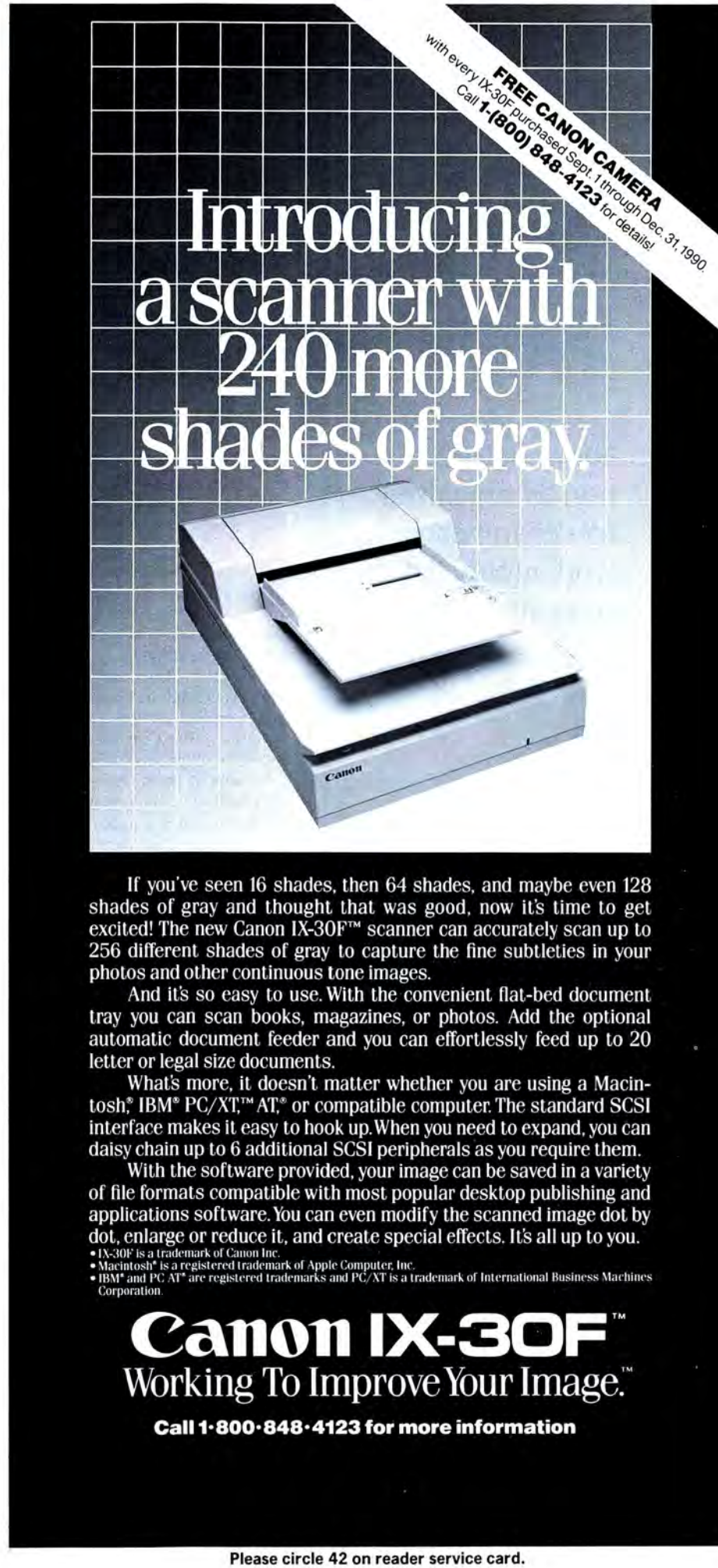
ISDN is not easily accessible here in the U.S. and won't be for some time to come. Optimistic estimates are that by 1993, major metropolitan areas and their surroundings will have access to ISDN. Compared with Europe and Japan, the U.S. is lagging behind. Most of Europe will have ISDN within a few years.

ISDN also isn't going to be cheap. Users will have to buy their own NT1 and TE (ISDN phone or ISDN card for the Mac). Since this is a new technology, the price will initially be high. ISDN lines will cost an estimated one-and-a-half times as much as today's analog lines. If you're using a single line, alternating its use between voice and data, this will mean a price increase. But if you're using two lines — one for voice, one for your modem — ISDN will save you money.

There are other problems with ISDN. Because the phone company won't provide power for ISDN equipment, the NT1 and the TE will need to be powered locally. In the event of a power outage, an ISDN phone system will go dead unless it has a noninterruptible power supply. Maintenance is another problem. Because customers will own the NT1, telephone technicians will need to come into users' homes to troubleshoot line problems — they won't be able to do it by climbing up a pole any more.

As it did with cellular telephones, the business market will have to popularize ISDN, which offers lots of benefits to this market. ISDN can usually replace expensive leased lines. Wide-area networking is another obvious application area, and ISDN's high-speed-fax capability is attractive. The bottom line is that ISDN's ability to send large amounts of information for a relatively low price will ultimately assure ISDN's success. Home users will follow business when equipment prices drop and ISDN-based services (banking, on-line services, and so on) become available.

Widespread ISDN is going to happen. Sooner or later. Definitely sooner outside the U.S. and probably later within it unless all the players agree to support ISDN here the way it's supported internationally. Either way, ISDN is going to fundamentally change the way we telecommunicate. For the better.



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Work Groups or Work Teams?

Networks are usually organized by departmental work group, but sometimes this arrangement can slow things down.

An AppleTalk internet is a collection of interconnected work-group networks that are usually joined together by a backbone network. Typically, the work-group networks are LocalTalk. Although LocalTalk is sometimes used for the backbone as well, the higher-speed Ethernet is often used too. Thousands of AppleTalk internets around the country are organized according to work groups because this design follows our assumptions about the nature of business communications.

We tend to think of people as working in departments, all performing similar functions — such as a group of designers working on a car's fuel system or a group of salespeople. So when we design AppleTalk internets, we tend to use departmental boundaries to define work-group network boundaries.

Three assumptions guide this design strategy. First, we assume that people have the greatest need to share information with, and therefore communicate most frequently with, others in their department. Second, we assume that since users in the same department usually sit together, they will share the same printers, because people tend to use the printer that involves the shortest walk. Third, we assume that department size corresponds to the acceptable maximum (20 to 25 people) LocalTalk work-group size

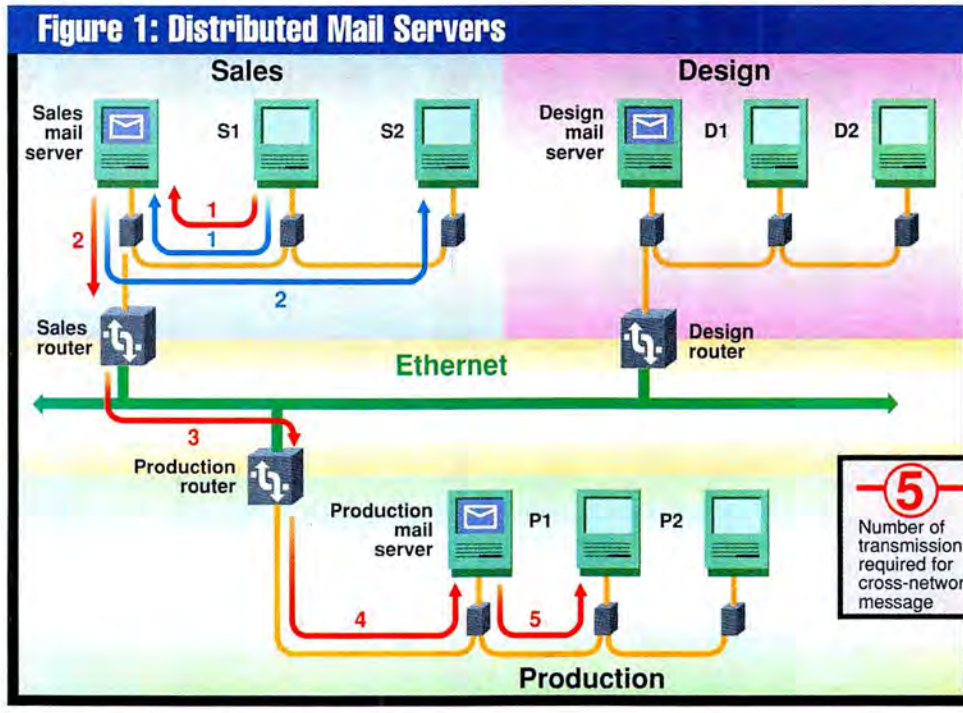
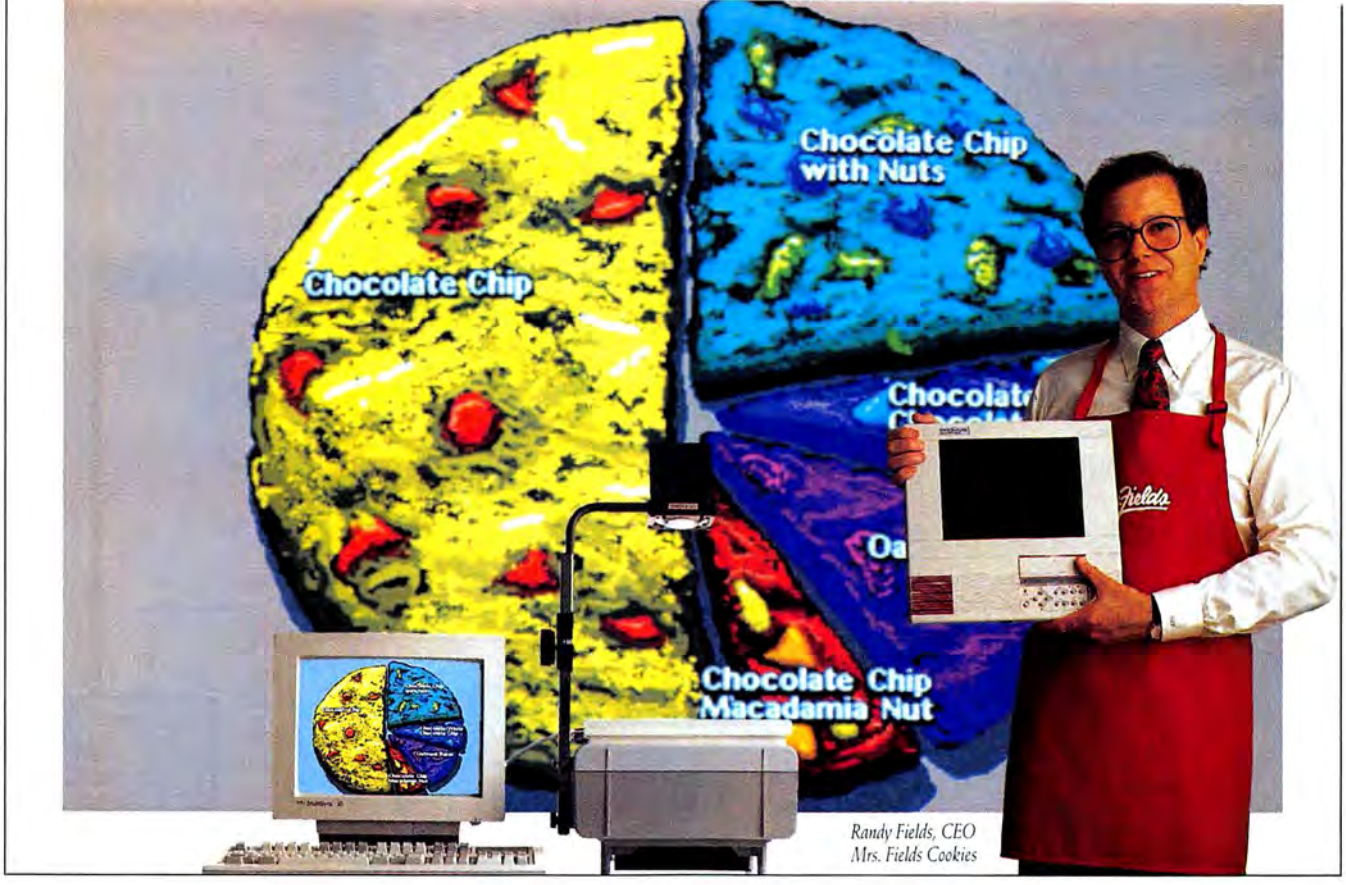


Figure 1: Electronic mail using a distributed-server approach. Each LocalTalk work group has its own mail server. The work groups are connected by routers to an Ethernet backbone.

By Kurt VanderSluis



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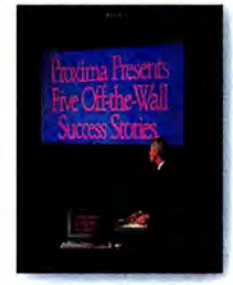


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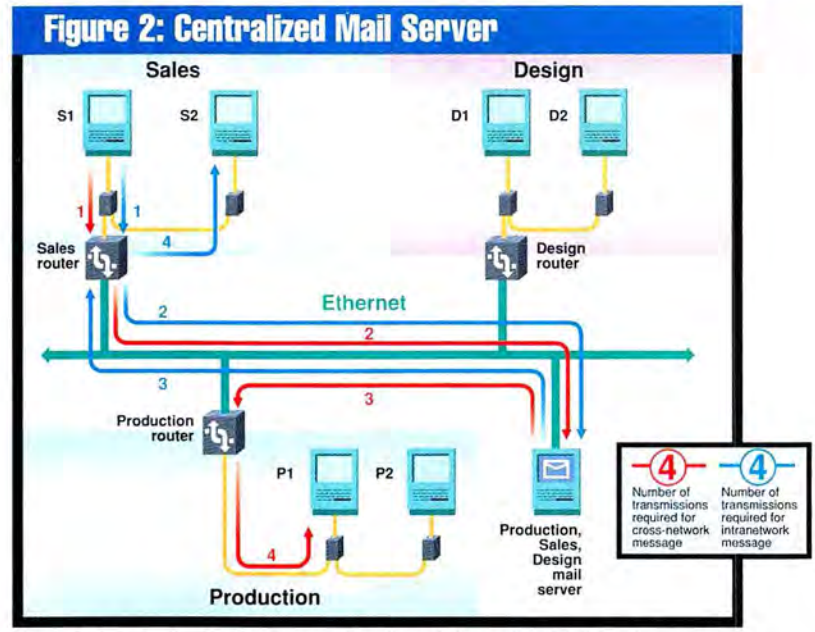


Figure 2: A centralized-server approach to E-mail. Three LocalTalk work groups share a mail server connected to the Ethernet backbone network.

(see "The Limits of LocalTalk," September '90, page 299).

Are these assumptions valid? Not always. Let's consider a department of product managers, who generally deal with people from several departments. In guiding a product from conception to market, product managers deal with engineers; designers; drafters; and marketing, sales, finance, and production people. This example demonstrates how grouping people into LocalTalk work groups along departmental lines may not always be the best choice, because people in a *work team* may not work in the same department. In the earlier example of the fuel-system designers, the work *group* — people performing similar functions — is the same as the work *team* — people working together on the same project. In the example of the product managers, the work team is different from the work group.

Understanding how work teams are formed requires an understanding of users, which isn't necessary in understanding how departments are formed. All you need is an organizational chart to understand departments. To understand work teams, you must interview the users and discover their communications needs.

What does this have to do with network design? Everything. You want to make the shape of your internet follow the shape of your business communications. On any but the simplest of internets, most messages do not travel directly from their source to their destination — they make many stops along the way. To design an efficient and effective network, you must minimize the number of these intermediate stops. Efficiency is an important factor in an electronic-mail system.

With efficiency in mind, let's look at three different designs for a three-department E-mail system. Each department is connected in a LocalTalk work-group network, and each of the three networks is connected to an Ethernet backbone via a LocalTalk-to-EtherTalk router. By counting the number of times that a message is re-sent as it moves through the internet, we can develop a "score" for each alternative.

For the first design, we operate under the assumption that work teams are organized by department; therefore, we put a mail server into each of the three work groups (see Figure 1). This is called a distributed-mail-server approach. If Sales user 1 (S1) wants to send a message to Sales user 2 (S2), the mail message will be sent twice (blue arrows) — once from S1 to the Sales server and then again from the server to S2. But if S1 wants to send a message to Production user 1 (P1), the message must be sent five times (red arrows) — S1 to the Sales server; the Sales server to the Sales router; the Sales router to the Production router; the

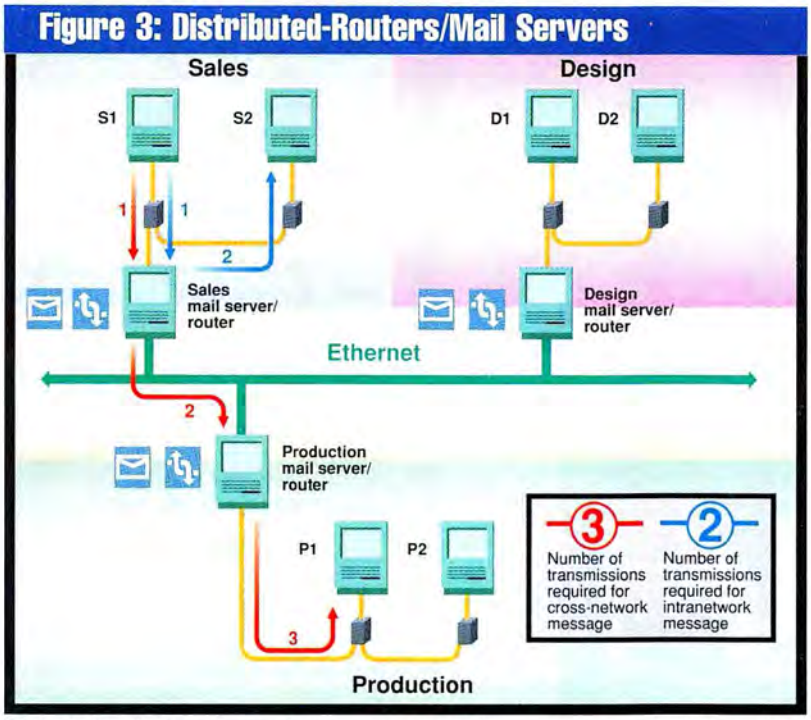


Figure 3: The distributed-router/server approach combines a software router with a mail server running in the same machine, and it significantly reduces the number of times a mail message has to be re-sent to travel between LocalTalk work-group networks.

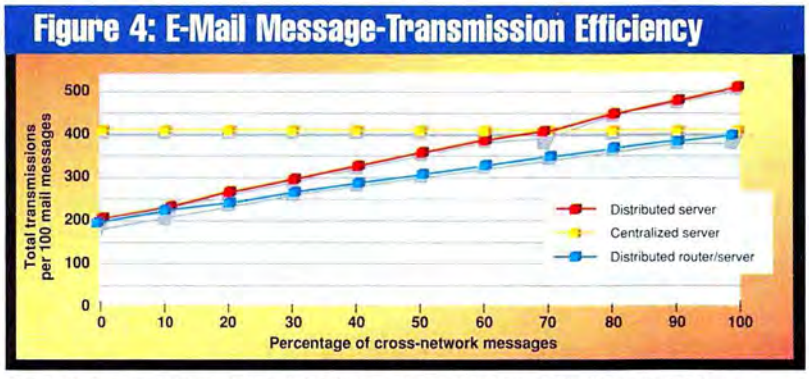


Figure 4: A numerical analysis of the three approaches to E-mail. As the percentage of mail messages sent between LocalTalk work-group networks increases, the total number of transmissions required by the distributed-server and distributed-router/server configurations grows, while the number required by the centralized-server approach remains constant. Regardless of what percentage of messages move between networks, the distributed-router/server approach is the most efficient.

Production router to the Production server; and finally, the Production server to P1.

If we interviewed the users in the three departments and found that most messages did not stay in the department (unfortunately, no AppleTalk software tool currently available measures this), we might start to question whether our distributed approach to mail servers was the best one to take. Let's use the same analysis method to compare the distributed approach with a second design, a centralized-mail-server approach, in which all three LocalTalk work groups use a single mail server attached directly

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to the backbone Ethernet network (see Figure 2). In this configuration, any message from any user to any other user would be generated four times — sender to router, router to server, server to router, router to recipient — regardless of whether the source and destination were in the same LocalTalk network or not.

Many companies have decided that software routers make more sense for their internets than hardware routers. One of the advantages of software routers (for example, Liaison, recently acquired by Farallon, or Apple's AppleTalk Internet Router) is that you can run other services in the Mac that is also performing the router service. Let's perform the analysis one more time for the third design, a distributed approach using mail servers running concurrently in the same machine as a software router (see Figure 3). In this configuration, a message that stays within a single LocalTalk work-group network gets sent twice, and one that goes from one work group to another gets sent only three times. This makes the distributed-router/server approach the most efficient of the three designs.

Figure 4 shows the total number of transmissions that must be sent on the internet to deliver 100 mail messages from their sources to their destinations. A distributed-server approach requires four transmissions per message, regardless of whether messages remain within a single LocalTalk work group or travel between work groups. Both the distributed-server and distributed-router/server approaches require more transmissions per message for cross-network messages than for intranetwork messages, so as the percentage of cross-network messages grows, the total number of transmissions grows as well. Still, the distributed-router/server approach is the most efficient of the three approaches in all cases, and I therefore recommend it for E-mail.

This counting method of analysis helps make more-efficient networks, and it is an approach to designing networks that works well for E-mail. However, if we want to perform this analysis for file transfers, speed might be a higher priority than message-resending efficiency. For file transfers, we might try to minimize the number of routers that a message has to pass through, rather than trying to minimize the number of times a message is sent, because each router introduces a significant delay in end-to-end transmission time.

In a complete network-design analysis, the chances are high that you would be looking for a solution that worked for both E-mail and file transfers, so you would need to consider both efficiency and speed as design values. You might also be using the network for print spooling, modem sharing, or other functions. The key to designing better networks is understanding your needs, defining what "better" means, and developing a counting method to test alternatives.

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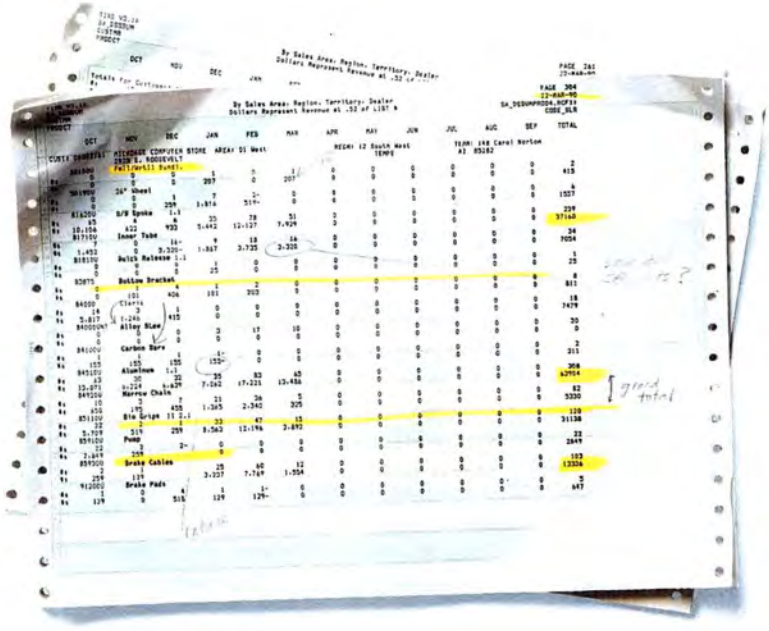
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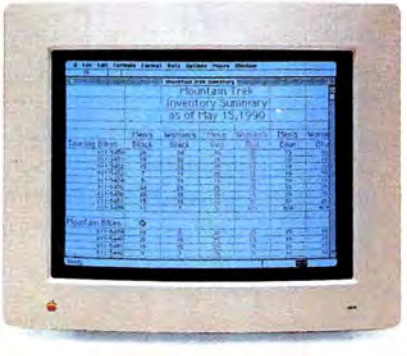




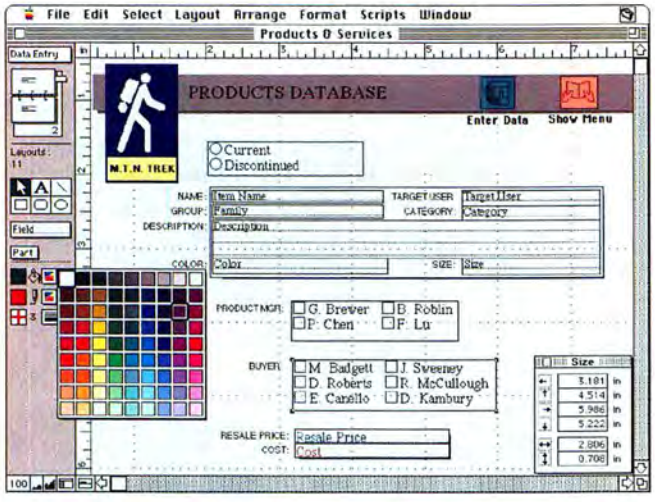








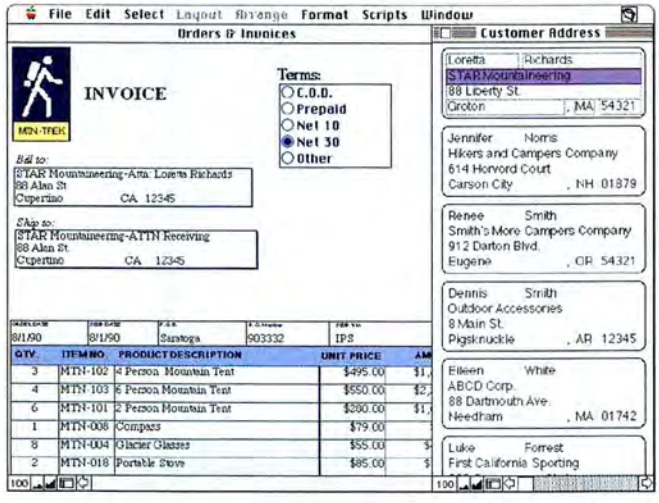
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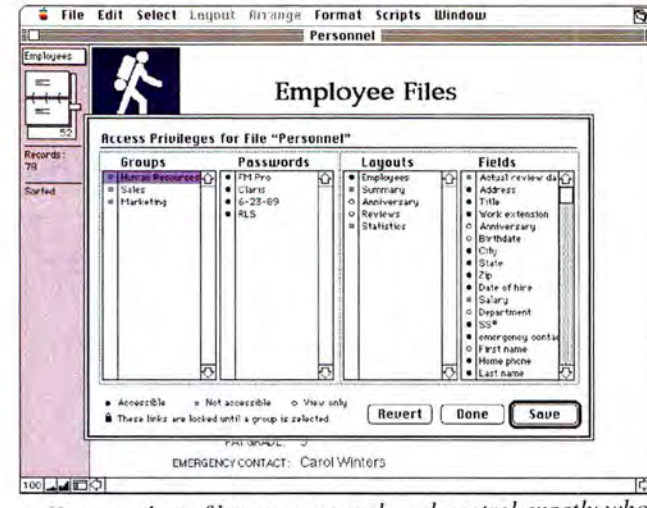
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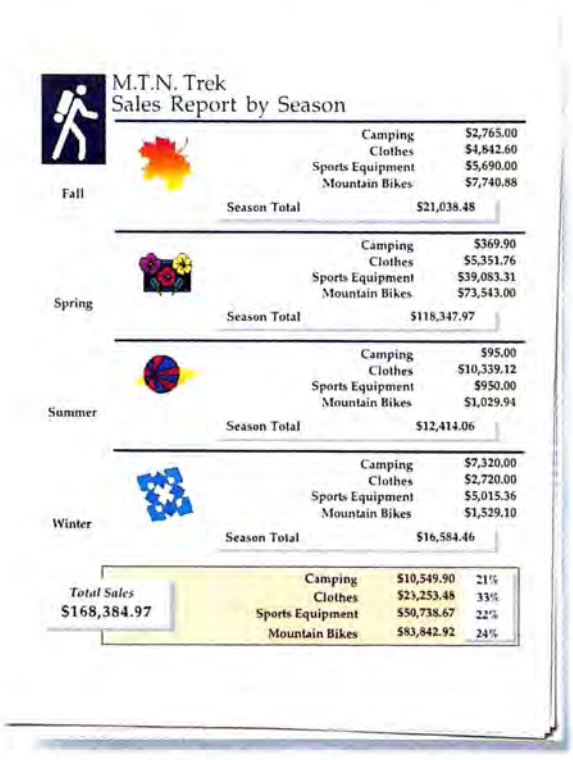


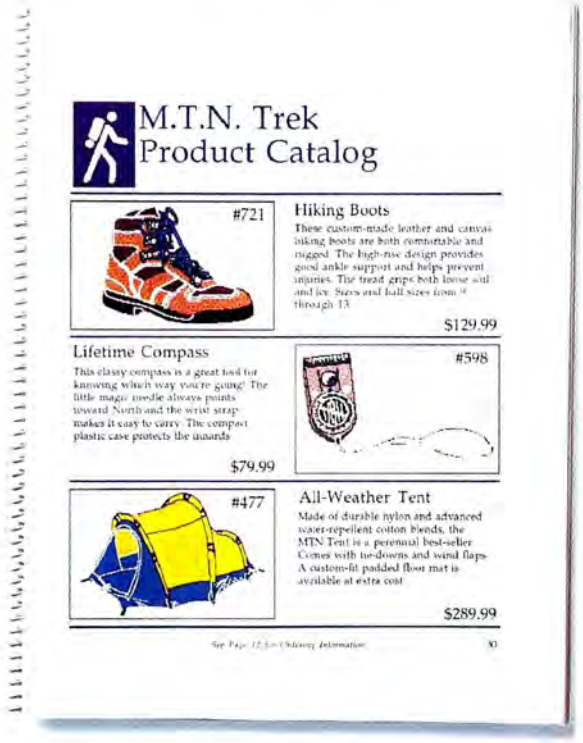
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By Roger Gilbert

Out of the hundreds of shareware programs posted on bulletin boards, distributed at user-group meetings, or brokered through commercial shareware resellers, a few break out from the pack and become top-ten hits.

In fact, *MacUser* published a list of the top 50 last December ("The 200 Best Macintosh Products," page 171). This month, instead of covering well-known hits such as StuffIt and Boomerang, we decided to seek out newer, "unsung" shareware that most people haven't heard about yet.

I've divided these programs into three categories. The "Serious Contenders" section lists sophisticated programs that could easily be marketed through conventional channels. I've subjected them to *MacUser*'s usual review criteria and assigned them mouse ratings.

"One-Trick Ponies" contains invaluable little programs that do only one job but do it well. If one of them sounds like it does something you've been wishing for, it's well worth your while to try it out.

Finally, some of the more whimsical items are collected in "The Lighter Side." This stuff probably won't make you more productive, but Mac users have always placed a premium on their computers' being productive *and* fun.

Serious Contenders

1. ASCII Chart DA 3.2

If you've ever spent more than a minute searching for a character in the Key Caps DA, here's relief. ASCII Chart DA will appeal to people who use a variety of fonts and want to find hidden characters or keystrokes quickly and also to programmers hunting for hex equivalents.

The DA shows all 256 characters for a font in a chart. You can easily change fonts by using the Font menu. Clicking on a character shows what keystroke or keystroke combination accesses it, and you can display a character at 72 points for close examination. This tool's only drawback is that it doesn't print. Author: Jon Wind. Free.

2. BaseToBase DA 1.0

One of the simplest and finest DA calculators for converting numbers easily from decimal to hexadecimal, octal, or binary, this little utility also sports logical operations and other functions (see Figure 1). Author: Remy Malan. Free.

3. Blesser 1.1

If you need to switch between various System Folder configurations on your hard disk, Blesser is the ticket. This small freeware application lets you "bless" one System on the SCSI chain to make it the active System. Use it to conveniently store alternative Systems such as small System Folders for games or foreign-

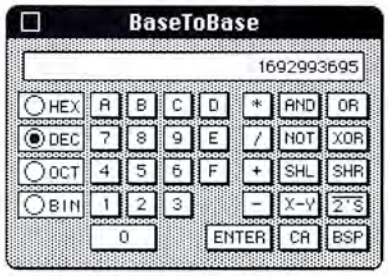


Figure 1: Programmers can convert numbers from decimal to hexadecimal, octal, or binary at the drop of a menu with the BaseToBase DA.

language System Folders on the same hard disk without conflicts during startup.

The one drawback of Blesser is that it prevents you from accessing the Set Startup defaults for MultiFinder when restarting a switched-on system. Author: Dave McGary. Free.

4. BroadCast 1.2 ★★★

If you have a small network and can't afford an expensive E-mail system, one way to keep in touch on-line is to use BroadCast. It lets you send short messages over an AppleTalk network to one or more users.

To send a message, you open the Chooser and select BroadCast and the name of another user. You must keep messages short, but you get the unusual option of choosing from a selection of icons to accompany the message. Recipients can respond without accessing the Chooser. Unfortunately, all chatting must be done in real time; you can't leave a message in someone's mailbox. Author: Joachim Lindenberg. Shareware fee, $25 per AppleTalk zone.

5. Clipboard Magician ★★★

If you've come up empty while making data transfers on the Clipboard, you may need a trick or two from the Clipboard Magician. This DA accesses the Clipboard in a Scrapbook-like window and lets you manipulate the data. It comes with a "magic wand" that helps you coax data through seemingly impossible hoops. These techniques take practice, but Clipboard Magician is a powerful tool if you can work through the learning curve. Author: Ed Lai. Free.

6. Color Bits 1.0 ★★★★

Compared with previous generations of icon managers and icon-drawing utilities, Color Bits is a dream come true. It's still not the ultimate icon-manufacturing machine, but it lets you quickly draw a new icon or add color or revisions to an existing one (see Figure 2). And it doesn't require ResEdit. It's compatible with Icon Colorizer and SunDesk. Author: Ben Haller. Shareware fee, $10.

7. Dir-Acta-Ry ★★★★

Using folders is a great way to keep things tidy on your desktop, but they can get in the way when you're trying to get an overview of what the whole directory contains.

The Dir-Acta-Ry application takes a picture of the files and folders on the main disk and stores it in outline form. You can read the file with any of the Acta (shareware or commercial) DAs/applications or with other outlining programs.

For a free program, Dir-Acta-Ry features an impressive array of display and directory view options. You can even select whether you want to include invisible (hidden) files in the directory list. Author: David Dunham. Free.

8. Gravitation Ltd. 4.0 ★★★

Want to play with the solar system? How about making your own and watching your planets coexist or collide? That's the object of Gravitation Ltd., an educational application that's reminiscent of the far more expensive commercial program Interactive Physics.

Gravitation Ltd. comes with 21 prefabricated solar systems, but you can easily start from scratch and design your own system. Enter the weight values and velocities for planetary objects, and watch the animation play.

The graphics representing the planets are crude, and this version is limited to black-and-white. But this is an educational tool that's fun to use, even without polished color graphics. Author: Jeff Rommereide. Shareware fee left to user's discretion.

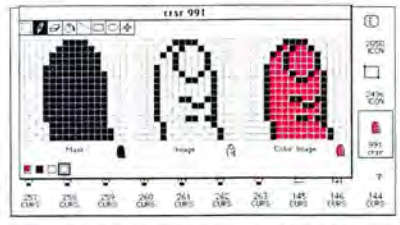


Figure 2: Color Bits lets you quickly draw a new icon or add color or revisions to an existing one — without resorting to ResEdit.

9. MIDI Companion 1.0 ★★★★½

If you're into MIDI — the universal connectivity language of music hardware and software — and you use a Mac, you'll want to look at MIDI Companion. This MIDI tool allows you to patch MIDI signals, sounds, and channels through the DA and separate sounds for single-channel playback.

MIDI Companion comes with extensive docs, but you still need to know something about using the Mac with MIDI. Author: Robert Patterson. Shareware fee, $15.

10. Speedometer 2.0 ★★★★

Tired of guessing what a particular INIT or set of startup documents is doing to your Mac's performance? Try Speedometer. It's easy to use and fairly comprehensive. The documentation tells you what to watch for to clock your Mac through a wide range of tests. You get charted results, so you can compare your system's performance with that of another machine (see Figure 3). Author: Scott Berfield. Shareware, $25.

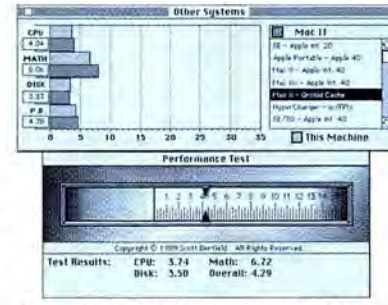


Figure 3: Anyone can benchmark a Mac with Speedometer and then graph the results to compare them with those for other system configurations.

One-Trick Ponies

11. Alias 1.01

Here's a chance to preview one of the techniques Apple's System 7 will offer. Alias is an application that lets you create a duplicate icon of an application and place it anywhere in the folder hierarchy. Although the created document occupies only about 2K, it can launch the application it mimics, which can be buried folders away.

Alias works with MultiFinder too. Aliasing is expected to be used by Apple in the forthcoming System as a technique to let users install applications

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What Is Shareware?

If you decide to use a particular shareware program on a regular basis, you should rightly pay the author a fee. If the software's free, the author says so; otherwise, pay any requested fee!

Paying fees is not only the honest thing to do but it also benefits you as a user. Unless an author has an incentive to keep up interest in a program, you may never see updates. Receiving enhanced feature sets and maintaining compatibility with current Systems are key reasons to help support and promote your favorite shareware utilities.

All credible sources of shareware provide the complete files for each program. This means you'll usually get a Read Me file or some other documentation along with the program itself. Documentation is important, because it usually provides instructions as well as information about payment.

easily onto the Apple menu. Author: Richard Harvey. Free.

12. AltCDEF 1.1.2

Overexercising your mouse on the scroll bars can be annoying. AltCDEF comes to the rescue by putting bidirectional arrows at each end of them. Compared with other renditions of scroll-bar enhancers, AltCDEF has the cleanest and most unobtrusive interface, and it comes with special Shift and Option commands for added scrolling benefits. Author: Alexander Colwell. Free.

13. BundAid 1.1

If you've lost a document's icon or double-clicking on the document doesn't bring up its application, it's time to try BundAid. This application goes beyond rebuilding the desktop — it gets to the root of the problem by resetting improperly set bundle bits, which tell whether a file has an icon associated with it. It all sounds technical, but the program is easy to use. You scan a disk or partition with BundAid, and it takes care of all the bundle bits for you. Author: Jim Hamilton. Free.

14. ColorDesk

Are you envious of a colorful background picture on someone else's desktop? Start using ColorDesk, an advanced version of the INITs that allow illustrations to replace the background patterns. ColorDesk is a cdev that allows a color PICT image to serve as a background scene and lets users change the image at any time with a new picture located in any folder on a hard disk. Author: Paul Mercer. Free.

15. MountEm 1.5

MountEm is an Fkey that can help you mount unmounted disks along the SCSI chain. It was initially designed for use with SyQuest drives to eliminate the need to have the SCSI port polled. With MountEm you can mount or unmount obstinate hard-disk drives or other devices that won't seem to mount any other way. Author: Bill Steinberg. Free.

16. Mouse2 v. 1.4a

Perk up your mouse with Mouse2, an INIT that automatically doubles the mouse's tracking speed. If you're not using AltCDEF yet, try using your refreshed mouse to practice running back and forth between the scroll-bar arrows. Author: Ryoji Watanabe. Shareware fee, $5.

17. Screener 2.0

Are you a Mac II owner who wants to run a favorite pre-Mac II program? The Screener cdev helps put some of these programs back to work by redefining the screen so it acts like a smaller monitor. This technique doesn't always work, but it's worth a try for any program you'd like to see up and running again. Author: Frank Price. Shareware fee, $5.

18. The Fondler 2.0

One more tool to add to the font fray is the Fondler. This Font/DA Mover alternative is designed for moving families of harmonized LaserWriter screen fonts from one set to another. It checks for font conflicts too. Author: Jim Lewis. Shareware fee, $10.

19. UnScrolly

UnScrolly cuts the time you need to get things done in the Control Panel. It strips out the Control Panel icons so you can view all cdevs by name. The UnScrolly cdev is a must for Macintosh users who make frequent trips to the Control Panel. Author: Frederic Miserey. Free.

20. WindowShade 1.1

WindowShade is a utility for people who use MultiFinder and get buried under

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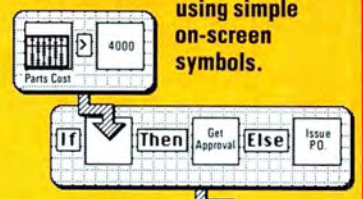
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piles of windows. This shareware cdev does exactly what its name suggests. When you double-click on any window's title bar, the window disappears as if it's been rolled up into the title bar. When you click on the title bar again, the window reappears, without forcing you to close data files that you might want to keep open. This is extremely useful for information transfer among multiple documents and windows or for Finder actions such as duplicating documents or visiting the Trash while several files remain open. Author: Robert Johnston. Free.

21. Scroll Limit

It's hard to believe, but scrolling on some Macs is actually getting too fast — especially in those small dialog windows. That's where Scroll Limit comes in. It's a configurable cdev that lets you change the scrolling speed for just a single case or for a general default setting. Author: Ken McLeod. Free.

22. ProVue RAM Check 2.0

Have you recently handed over a few hundred bucks for RAM to some guy on a street corner (or some other place you didn't know too much about)? RAM Check should calm your nerves. It checks your RAM for any problems.

At startup, all Macs go through a self-check routine, but if you're having suspicious problems with your memory, use this application to make hundreds of passes through it to see if any glitches show up. Authors: Tim Capps and Mike Friese. Free.

23. Icon Colorizer 1.5

Icon Colorizer is a cdev that makes maximum use of available color icons. Like Color Finder and SunDesk, this cdev can open a file loaded with color icons, much as Suitcase II can open a DA or font. Icon Colorizer works with all cicn (original-color-icon resource) or icl8 (new-icon resource) files and is compatible with the Mac IIci.

Unlike its close competitor SunDesk, Icon Colorizer doesn't support color cursors. It also doesn't work on third-party color monitors that don't use Color QuickDraw. And you'll notice a definite slowdown at startup. But despite all of that, it's worth it to watch your desktop bloom with colorized icons. Full documentation is included. Author: Robert Munafo. Free.

The Lighter Side

24. MacNinja

There may be better things to do and better games to play than MacNinja, but its simple portrayal of a karate match will quickly hook those who enter into the match. The moves are fast and may keep you laughing much longer than you intended. Author: Ron Minor. Shareware fee, $10.

25. Big Cheese

If you begin playing MacNinja at work, it might be a good time for you to try out the cdev Big Cheese as well. This "panic key" gets its name from fooling your boss — the big cheese — into thinking you're doing what you're supposed to be doing. You start by taking a screen picture of what you should be working on (screen capture is a built-in function of the cdev) and then assign the picture to a user-definable hot key. If the boss walks by your cube, just press the hot key to look sharp. Author: Andrew Welch. Shareware fee, $5.

26. Ripper Fkey 0.3

When writers started working with computers, they lost the satisfaction of balling up their false starts and throwing them across the room into the garbage (hitting the Delete key just doesn't give the same relief). Ripper Fkey makes it possible again. Invoke this Fkey, and an animated ripping action, complete with horrific sound, will tear across your active window (see Figure 4). Author: Steve Blackstock. Free.



Figure 4: The Ripper Fkey lets users harmlessly indulge their destructive streaks, complete with sound effects.

27. TappyType 1.21

If you want your typing to sound just as noisy as Hemingway's and Fitzgerald's, TappyType is a cdev that adds keystroke sounds, space-bar sounds, and even a carriage-return bell when you press the Return key. The sounds can be

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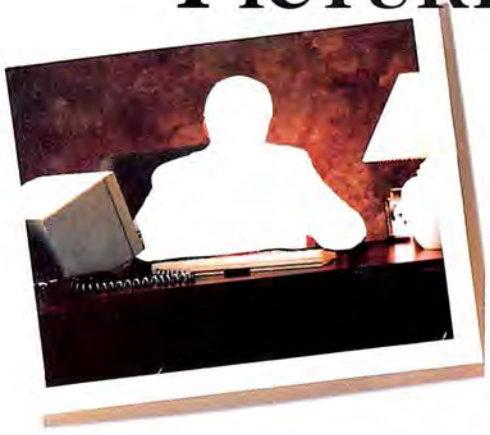
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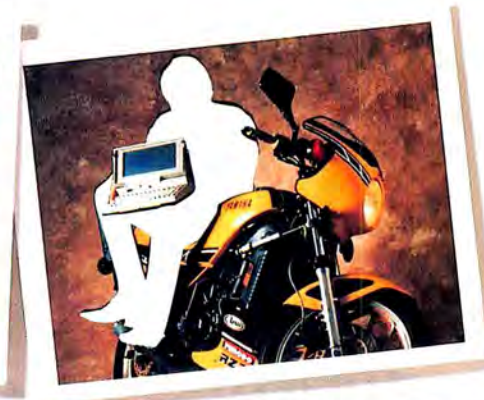
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turned on and off with a keystroke.

TappyType's Achilles' heel is that for some reason it won't work with Suitcase II installed. Author: Colin Klipsch. Free.

28. MacKeyboard

If you can't get enough keyboard action, MacKeyboard may be just the thing. It's a simple sound application that installs piano or other digitized sounds into your keyboard. Good for after hours when your fingers just want to keep going. Author: Terry Bertram. Shareware fee, $15.

29. Fish! 2.0

Put Fish! into your System Folder, and you'll have fish and divers swimming across the desktop. They won't interfere with your work, but you will notice a big fish occasionally nabbing a small one or a diver come swimming by with a harpoon. Fish! works fine in black-and-white, but the color show is much more lifelike. It requires generous memory. Author: Bogus Software. Shareware fee. $20.



Figure 5: You can place this globe anywhere on your desktop and leave it spinning.

30. Globe

Strictly a conversation piece. Put this colorful spinning globe anywhere on your desktop (see Figure 5). Try resting the spinning earth on top of a window and going to lunch. It's easy to get running and comes with configurable rotating speeds. Author: Paul Mercer. Free.

31. Solarian II 1.02

For an excessive dose of audiovisual stimulation, check out Solarian II. This high-quality color arcade game is set in outer space, where you're attacked by a menagerie of interesting characters. The game's humorous sounds and extremely professional graphics and presentation set this one apart as one of the best and most ridiculous shareware games out there. Author: Ben Haller. Shareware fee, $25.

32. SpiNit INIT

Most people will want to use this INIT for about two minutes, and then they won't be able to take it any more. But you can be sure they'll show it to someone else. When you open a window, it's like watching special effects from Hitchcock's *Vertigo*. Author: Jonathan Gary. Free.

33. Melt DA

Invoking this "screen saver?" triggers a slow oozing animation of your current desktop melting — windows, menus, and all. This can put you in a contemplative mood. The melting action is compatible with the Mac IIci, but it runs extra fast on that computer. Author: Gordon Acocella. Free.

Free Markets

BBS Services

Local BBSs (bulletin-board services) or national services such as CompuServe's MAUG forum, America On-Line, and *MacUser*'s own Zmac service usually have the latest offerings. (If you'd like to find all the files in one place, visit the Zmac Download Forum.)

If you're a member of CompuServe, just type GO ZMAC or GO MACUSER at any ! prompt. Then choose the Download Library from the main menu. If you're not a CompuServe user, look elsewhere in this issue for sign-up instructions.

User Groups

You can easily get almost any shareware offering through user groups — especially national user groups such as the Boston Computer Society (48 Grove St., Somerville, MA 02144; [617] 876-4835) and the Berkeley Macintosh Users Group (1442A Walnut St., #62, Berkeley, CA 94709; [415] 849-9114). The major user groups are now producing CD-ROM discs loaded with shareware. If you have time, stop by your local user group and see what's available.

Disk Services

And there are also mail-order disk-library companies such as EduCorp (531 Stevens Ave., Solana Beach, CA 92075; [800] 843-9497 or [619] 259-0255), and Software Excitement (P.O. Box 3097, Central Point, OR 97502; [800] 444-5457). You can purchase software collections on-disk from the catalogs of these services' libraries. It's important to realize, though, that when you buy from a disk service, you're paying for its collection efforts, not for the shareware itself. You're still obligated to pay the full fees for shareware you use regularly.



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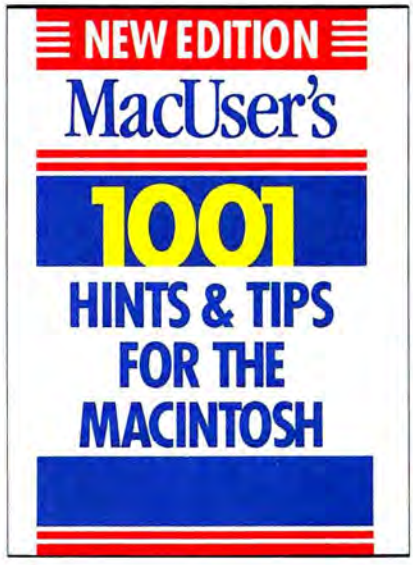
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The Slow Switch and the Dog-Faced Clock

By Michael Swaine

The name of this magazine is *MacUser*, not *MacFixer*. This is as it should be, because most of us are more interested in using our Macs than in fixing them. When we do encounter something that requires fixing, we resent it. As likely as not, it's an INIT problem, and do we ever resent those.

"Do something about INITs, quickly!" — J. Vallot, Pontoise, France, advising John Sculley in *MacUser*, August '90, page 12.

INITs are the Startup documents, such as Apple's MacroMaker and ICOM Simulations' On Cue, that are loaded into memory on startup, if they have been placed in the System Folder. INITs in the System Folder act as though they are part of the System file itself, a bit of magic supported by an INIT known as INIT 31 in the System file. Because INITs are loaded automatically, a buggy INIT can crash the system before you can disable it by removing it from the System Folder — locking up the machine in a nasty situation that could be called catch-31. Even when they do load successfully, INITs may conflict with one another.

Various INIT managers — Aask, INITPicker, Inix, INIT Manager, INIT cdev, and TattleTale — have been developed to deal with such problems. These managers are all INITs too, and they tend to conflict with each other. The only sure method of resolving an INIT problem is to keep removing suspect INITs from the System Folder and rebooting until the problem goes away. To deal with the INITs that lock up the machine, you need to follow Bob LeVitus' advice of keeping a disaster disk on hand to boot from.

INIT management today is mostly disaster cleanup. What the INIT managers do, generally, is allow you to turn off or alter the loading order of INITs. What they don't do, generally, is tell you what the problem is. If you knew that, you might be able to fix it.

Apple will do something about INIT problems shortly. With version 7 of the System software, we will find, no doubt, new versions of all our favorite INIT problems, which will demonstrate new ways not to work and which will make all our version 6 INIT-handling tricks obsolete. Sufficient unto the day is the System-software version thereof, so until System 7 makes all our lives more interesting, what can we do about debugging version 6 INIT problems?

Maybe what we need is a Slow switch.

The Slow Switch

"Five new front panel switch positions have been added to the ALTAIR 8800b computer to expand the front panel capability [including a] SLOW position [that] permits execution of a program at a rate of approximately 2 machine cycles per second or slower. The normal machine speed is approximately 500,000 machine cycles per second." — *altair 8800-b Technical Information Package*, MITS, 1976.

Most Mac users would not applaud a decision by Apple to put a Slow switch on the front of the Mac. It was a good feature on the altair, though. In 1976 there were no Mac users, or personal-computer users of any stripe really. What there were were electronics hobbyists, gadget freaks, programmers, entrepreneurs, and brave-and-bloodied pioneers. All of them were necessarily fixers rather than users, because the first personal computers didn't work. The Slow switch was a useful tool for them, and a kind of Slow switch could be useful now

An INIT Manager's Responsibilities



A good INIT manager should at least do these three things — help you identify troublemakers, make it easier to manage different sets of INITs, and document exactly what happens when INITs are loaded.

for any Mac user forced to act as a Mac fixer.

The Slow switch on the altair was a program-debugging tool, and slowing down the programs was, paradoxically, a good way to speed up the debugging process. It allowed programmers to step through the execution of a program, one machine instruction at a time, looking for any funny stuff. The results of each instruction could be displayed in binary in the rows of lights on the machine's faceplate, or front panel.

If you were a machine-language programmer and if the Mac had a front panel, you could use a Slow switch to step through the INIT-loading process, reading off the results on the front panel and looking for any funny stuff. It doesn't, you're probably not, and it wouldn't work anyway, because the Mac is more complicated than the altair. But there is a tool that does the same job and that is usable by nonprogrammers. (There is also, no foolin', a software Slow switch called Sludge, just for Mac programmers. We won't talk about that here, because the name of this magazine isn't *MacProgrammer*.)

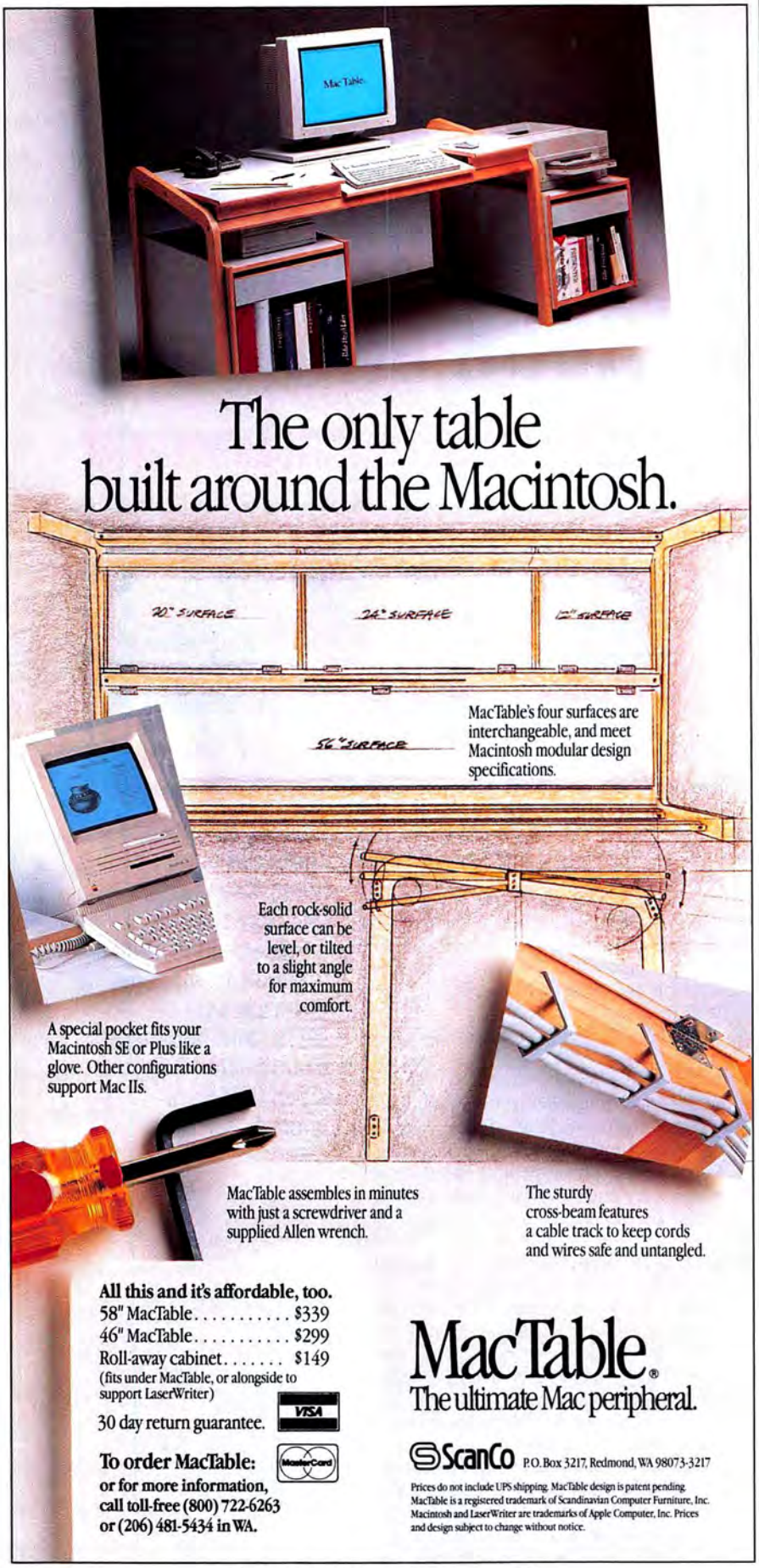
The Dog-Faced Clock

Enter INIThound, the Slow switch and front panel for debugging Mac INIT conflicts. The Slow switch has become a dog-faced clock, and the front panel is now a cdev and a collection of printed reports. Nothing stays simple.

I first encountered INIThound over dinner. I was sitting with a dozen or so Mac software developers; conversation led in predictable directions, and I left the dinner with a pocketful of disks from developers eager to have their work mentioned in *MacUser*. One of the disks contained INIThound, and I found it surprisingly useful.

With INIThound, you can monitor the INITs in your system, see what they are doing, turn them on or off, delay between INITs, and print out core dumps — er, excuse me, reports on INIT activity. You control INIT loading directly, as INIThound displays a clock that looks like a bloodhound before each INIT loads. While the clock is visible, you can disable the INIT or begin tracking its activity.

INIThound was written by Steven J. Tubbs and is available from his company, Cambridge Information Ware, P.O. Box 1296, Cambridge, MA 02238-1296. It runs on any Mac with more than 128K.



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BEATING THE SYSTEM

Who Was That MITS Man?

In an age and an industry that often undervalue history, this month's puzzle may seem a little banal, but knowing the past can at least give you an ironic perspective on progress. Mac INITs are something like DOS TSRs, and the INIT problems we see today are a lot like the TSR conflicts of a few years back. Then, as now, the simplest solution was not to use the things. Then, as now, that solution had the advantage of putting pressure on the vendors — and today through the vendors onto Apple — to come up with standards or safeguards that prevent the conflicts. If then, as now, the outcome was a new operating system with new problems, well, that's progress.

The MITS altair, by some accounts the first personal computer, didn't have INITs or TSRs, but it had enough problems to foreshadow every glitch, bug, crash, and bomb we've seen since, and not just because the kid who wrote the altair's programming language is today the chief executive officer of Microsoft. "Every good idea was half-executed at MITS," this programmer once told me, with an ambiguity that has served him well in dealing with IBM, and indeed the first personal-computer company half-launched a lot of good ideas and meteoric careers.

Knowing something about MITS could win you a T-shirt. I'll send an "I Beat the System" T-shirt to the person who sends the best answer to the following question before the arbitrary cut-off date: Who is the MITS documentation writer who also started the first computer trade show, and what is his connection with the Macintosh? (He is not the aforementioned programmer.)



Send your solution to:

Michael Swaine
c/o *MacUser*
950 Tower Lane
18th Floor
Foster City, CA 94404

Looking for Funny Stuff

Here are some specific INIT problems and INIThound solutions or debugging approaches:

Problem. Since you installed a new INIT in the System Folder, that INIT or another one doesn't work or the system crashes or won't boot.

Solution. Find the culprit. INIThound gives you a chance to disable any INIT during the startup process, just as it's about to load. If there's a conflict between two INITs, this won't necessarily tell you which is the villain but it will tell you not to use them together. You can also more or less permanently disable any INIT without removing it from the System Folder. Any INIT manager will do some variation of this.

Problem. You've identified compatible and incompatible INITs, and you use different sets of INITs depending on what you're doing. This approach demands that you remember what INITs can work together and that you reboot after moving the appropriate set into the System Folder.

Solution. INIThound, like some other INIT managers, can manage sets of compatible INITs. INIThound lets you leave all your INITs in your System Folder; sort them into sets of mutually compatible INITs; and assign a label to each set, such as Jackie's_INITs or Do_not_use_with_AppleShare or MacUser_Editorial. Other INIT utilities do something similar.

Problem. You really need to know what's going on. A friend with apparently the same system setup as yours has no trouble with an INIT that gives you headaches. Or your system administrator refuses to let you use an INIT that you believe will not cause any problems. Or you have symptoms so intermittent that you can't pin down a culprit. Or you really need to use two apparently conflicting INITs together and are willing to pay someone to fix the one causing your problems — if only you knew which one was the guilty party and exactly what the problem was.

Solution. INIThound, alone among INIT utilities, tracks the activity of INITs as they load and produces a report of files changed, volumes mounted or unmounted, and memory locations modified, among other things.

Much of this information is largely incomprehensible to mere mortals, but some things are readily apparent. For example, in the low-memory report in Example 1, we see that both Pyro! and Suitcase II changed the same low-memory value. In



Example 1

```
— Begin low memory chain report
Memory ApplZone, at 0x2AA,
was originally 0x2304C, is now 0x266A0
It was changed to 0x233D4 by 'Pyro!™'
And then changed to 0x266A0 by 'Suitcase™ II'
Memory WWExist-QDExists, at 0x8F2,
was originally 0xFFFF0040, is now 0x40
It was changed to 0xFF000040 by 'Suitcase™ II'
— End low memory chain report
```

this case it's benign, but when this double-changing shows up in one of INITHound's reports called the Trap Patch Chain report, it may be signaling the most common source of INIT incompatibility. And even if you can't make any sense of the report, you probably know someone who can.

Of course, avoiding problems is also a way of dealing with them, and one common technique for avoiding INIT conflicts in an office setting is for the system administrator to prohibit the use of any INITs that are not known (by the system administrator) to be trouble-free.

This policy saves (the system administrator) a lot of trouble, and it's an excellent solution until it gets in the way of your using your Macintosh. That's the point at which you might decide to demonstrate the reporting capabilities of INITHound and challenge your system administrator to defend the policy in question. Sorry, system administrators; I don't want to make any trouble for you, but the name of this magazine is *MacUser*, not *MacSystemAdministrator*.

Users as Programmers and Users as Programs

The name of this magazine is *MacUser*, but what's a *user*? System 7 is going to blur the definition of the term.

One of the most profound effects of System 7 will be the greater power it will afford Mac users to configure and even develop applications. AppleEvents will lay the groundwork, and Apple's user scripting language, AppleScript, which will come later, will put into users' hands the power to tie applications together, creating new custom entities to handle specific problems. The version of HyperCard that ships with System 7 may be the first tool that gives a taste of this power, by allowing users to program the Finder.

What could "program the Finder" mean? Right now the shortest path to user programming is HyperCard. HyperCard is a model of the kind of user programming I mean: a mixture of activities that would not in the past have been called programming (copying and pasting buttons and other active objects, typing a command into a window, copying snippets of code) along with activities that users didn't engage in before (writing scripts, manipulating resources, redesigning menus).

But the HyperCard version that ships with the first release of System 7 will support AppleEvents. AppleEvents are a standard set of events and messages for standard Mac functions. FinderEvents are a subset of AppleEvents and represent the unbundling of the functionality of the Finder so that an application can use any part of it. Using HyperCard, via AppleEvents, you should be able to write a simple program of fewer than ten lines that performs a complex, repetitive task, not in the world of spreadsheet cells or database fields but in the world of the Mac desktop. In just the way that other applications let you manipulate data, HyperCard 2.1 will let you manipulate the objects of the Mac environment.

You Will Be a Programmer

This ability to program the Finder is only part of the user power to which System 7 will open the door. *User programming* is a handy umbrella term for the capability, but it's misleading. User programming will not require users to turn into people like the programmers of today. Users can continue to be primarily interested in the problem at hand rather than the tool for solving it. Users will not have to develop a taste for debugging (also known as "looking for funny stuff"). Users won't have to stay up late and ignore their loved ones unless they really want to.

But users will become programmers.

Programming is changing, though. The reason for the user/programmer distinction and the distinction itself are getting fuzzy. Programming is getting both harder and easier, creating different classes of programmers. And programming will be the main way to get work done under System 7 when it matures. This will not be the programming that application developers do or even what HyperCard-stack developers do. But it will be programming.

Programming is simply controlling the computer efficiently. The essence of the machine is that it can do repetitive tasks. Identifying and delegating to the box the repetitive parts of your work is something that only you know how to do, and therefore, ultimately, you have to have control of that process if you want to use the machine effectively. You have to become a programmer. The definition of *programming* I'm using implicitly here is not one that present-day programmers would endorse. That's all right, though; the term is not theirs to define, and no tight definition is appropriate, because programming is evolving. I choose to take as a defining characteristic of programming the automation of repetitive tasks, because it's a characteristic with survival value.

Yes, you will become a programmer, even if you always said it would never happen. You won't change, though; programming will.

Programming Literacy

At the risk of sounding like the typical high-tech drumbeater, I'd like to encourage anyone interested in getting the most out of next year's Mac to look to their programming literacy. What is usually called computer literacy is not enough; computer literacy is the stuff of matchbook-cover schools. What the power Mac users of today need for tomorrow is programming literacy.

The Virtual User

Besides, Apple has succeeded in replacing the ordinary sort of user with a piece of software, so we'd better all learn how to be extraordinary users.

The piece of software is called Virtual User, and Apple demonstrated it at the Apple Worldwide Developer's Conference in May. Virtual User is really a collection of tools for software testing: It allows developers to write scripts that try out options in the programs they're writing.

Virtual User is not a user tool, but it points in the same direction as AppleEvents — that is, toward the day when the Mac's System software is "self-aware" and can understand references to the elements that comprise it. No, not real self-awareness, but anthropomorphisms are hard to avoid. That pseudo-self-awareness is the objective of a future System-software release, beyond System 7.


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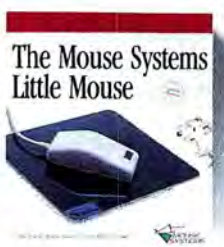
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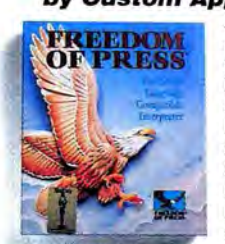
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THE EXPERT'S EDGE

The Self-Supporting Mac

Apple is famous for the quality of its customer support — lousy. If you'd prefer another kind, here are some answers and options.

In some ways, I pity Apple. As the company's introduced more and higher-end machines, things have gotten considerably more complex, supportwise. One reason Apple has no real customer-support group may be that there's too much to support. If ignored long enough, most users bumble their way to a solution, learn to live with the problem, or give up on using Macs.

Well, I hate to see people giving up on Macs, and I certainly don't advocate learning to live with a problem. Therefore, I've compiled a brief set of answers to questions users keep asking me. Curiously, Apple has already answered most of these questions in one forum or another (usually within the developer community or via AppleLink postings to dealers). It's only you, the users, who don't seem to get the answers.

How can I get rid of the single-pixel line in the lower portion of my AppleColor monitor? You can't. All Sony monitors have a thin black wire that runs horizontally across the tube about a quarter of the way up from the bottom. This wire is part of the system that holds the color monitor together. It's only the Mac's black-on-white windows that make it visible — ironically, on PCs, which have inferior displays, you usually can't see the line.

What's this about the Mac IIci's needing different memory? Is my dealer trying to pull a fast one? The IIci, unlike any other Mac model to date, needs what is called "fast page" RAM chips. Fortunately, virtually every 1-megabyte chip currently being made (and mounted on a 1-megabyte SIMM) can run in fast-page mode. Unfortunately, no 256K RAM chips can. Thus, to add a 256K SIMM set to a

A Crash Course



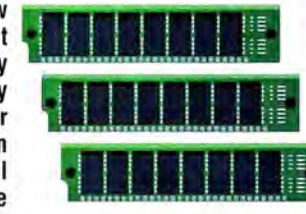
Check for a computer virus. If you don't have one of the commercial virus checkers, consider John Norstad's freeware program Disinfectant. Send a blank, formatted disk and return postage to John Norstad, Academic Computing and Network Services, Northwestern University, 2129 Sheridan Road, Evanston, IL 60208.



Make sure you're using the current version of your applications, as it's often impossible for developers to predict even minor changes in Apple's operating system and updates are inevitable. Also make sure that the program you're trying to use is intended for the equipment you own.



Remove all INITs and cdevs. Still crashing? Suspect a hardware or installation fault — take your computer to your nearest authorized dealer, and ask the dealer to run Apple's motherboard diagnostics on your computer and check your installation. Re-add INITs and cdevs one at a time until the problems resume. If the last one installed has a problem, either in interaction with others or because of a bug or design deficiency of its own, don't use it!



Add memory. Everyone I know who's added memory has found that crashes decrease. This may simply be because there's more memory for problematic software to wander aimlessly through (bugs are then less likely to stomp on some useful section of memory, such as the System heap).

MAC ON-LINE

Ask a user group or tech-support group for help. *MacUser*'s Zmac on-line service has an entire Tech Support forum. It's an excellent way to get your questions answered by experts. Many software and hardware companies also provide free tech support through CompuServe forums.

Every time my Mac has crashed, I've been able to solve the problem with one of these methods.

By Thom Hogan

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IIci, you have to make sure that the SIMMs are made up of 1-megabyte chips. Frankly, with memory prices the way they are, I recommend that you forget 256K SIMMs if you have a IIci — go right to 1-megabyte SIMMs (make certain they're 80 nanoseconds or faster, however).

Ever since I added an extension cable to my keyboard and mouse, I've been having problems. Apple says you can't have more than 5 meters (about 15 feet) of *total* cable connected to the ADB connectors.

HDSetup doesn't seem to work with my drive. Why? Apple has made it so that HDSetup recognizes only Apple-supplied drives. If you bought your drive from another vendor, the vendor is responsible for supplying any utilities you need to maintain your drive.

How can I determine the order in which MultiFinder opens applications on startup? Assuming you want program 1, program 2, and program 3 opened in that order when MultiFinder starts up, start program 3, program 2, and program 1 in that order, and then use the Set Startup command in MultiFinder to open applications and DAs. If you're a ResEdit buff, you can snoop the fndr ID = 0 resource in the Finder Startup file, which contains the applications to be launched, in order.

What do I need to have in my System Folder to make the machine start? Good question. The answer depends on the machine and the System version you're using. When in doubt, I always return to the original System Tools disk from Apple and perform a new installation on a disk, just to be sure.

OK, the answer to your next question is this: You can get a set of System disks from your Apple dealer (by having the dealer copy the disks from the CD-ROM disc Apple provides for such things — the dealer is allowed to charge you for the service — or by buying an "official" shrink-wrapped version). Alternatively, most user groups and on-line services keep a copy of the current System files around, although downloading all the files involved usually isn't very cost-effective.

Apple says I can read IBM PC disks with my Mac, but all I ever get is the "Disk not initialized" message. First, for your Mac to read an IBM PC disk, you must have a model with a SuperDrive (1.44 megabytes). This includes

all current models (except the Plus) but not older SEs or Mac IIs. Second, you must use Apple File Exchange to read the disk (see the instructions that came with your Macintosh) or purchase a third-party program such as Dayna's DOS Mounter. Finally, be aware that neither of these alternatives lets you *run* DOS programs — they only provide access to the files on the disk.

You can make sense of some DOS files if you have a Mac program that can translate the data into something your programs can handle (I suggest DataViz's excellent MacLinkPlus Translators) or a program that understands DOS file formats (some Claris and Microsoft programs understand some IBM file formats, for example). To actually run DOS software on your Mac, you need a DOS coprocessor board or Insignia Solutions' SoftPC software.

What's the best way to back up a hard disk? Trick question, this. The best way to back up a hard disk is to make sure that you've got it organized well in the first place. Here's what I do:

1. Format my new hard disk.

2. Put a System on it and add any INITs, cdevs, font files, and so on that go in the System Folder.

3. Create a folder for applications and then add my applications to that folder (in appropriate subfolders, of course).

4. Back up the hard disk so far and label it Boot/Aps.

5. Create a folder for data and create appropriate subfolders.

From then on, all I have to back up on my disk is the data folder. With the Bernoulli Box II I use (I highly recommend it, by the way), I can usually do a Finder copy of the data folder onto Bernoulli cartridges.

Even if you're still stuck in the floppy-backup group, arranging your hard disk correctly and doing incremental backups of only the data folder keeps the floppy pile to a minimum. Meanwhile, a side benefit of this arrangement is that the most frequently used files get put at the head of the hard disk, where they tend to load a little faster, whereas the most changeable files go at the end of the disk, where there is the most room for adding to them. This approach keeps file fragmentation to a minimum.

How do I park my hard disk? I recommend parallel parking. First practice with cones on a deserted street for several weeks before taking the drive out to the

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city for a real parking session. Seriously, virtually all hard drives now being made park themselves. Whether the auto-parking mechanism entails withdrawing the heads on power-down or having the heads land on an unused portion of the disk platter is unimportant.

What are the best and most useful cdevs and INITs available? First, a warning: Here at Macreations, we've traced through the operations of dozens of INITs and cdevs and have been a little frightened by what we've seen. A majority of them had potential memory-management or other conflicts that could cause crashes or idiosyncratic behavior when used in conjunction with other programs and utilities. Our experience is not unique — other developers I've talked to also have expressed serious reservations about the robustness of many of these small, clever programs.

So Thom's first rule of INITs is *use as few as you can*. Add them one at a time to make sure there's no conflict before committing to their use. Avoid useless duplication (I talked recently to one fellow who had ScrollInit, Boomerang, and Shortcut all loading into his System, despite the fact that these three INITs overlap in what they do — Boomerang was all he really needed).

Beware of memory hogs (for instance, ATM and SuperLaserSpool together, when set up to optimize printing speed, can easily chew through 2 megabytes of memory in no time).

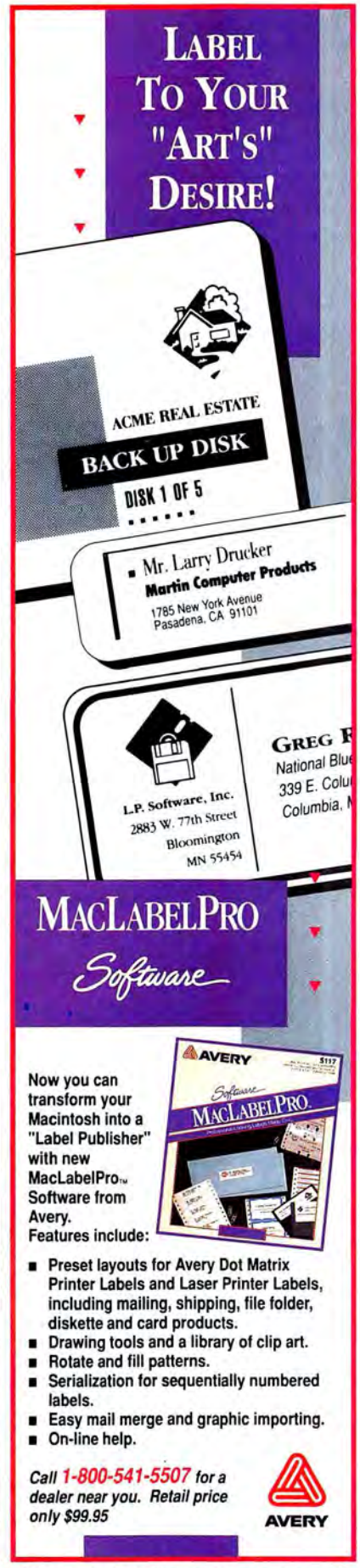
Even Apple has gotten into the act of warning about overuse of little System add-ons. Apple cautions that System 7 will change the relationship between the System and accessories, that many of System 7's features will directly replace some of the things you're using now, and that System-heap memory (where the System and most INITs and cdevs reside) is valuable territory that shouldn't be fought over or wasted.

OK, with those caveats aside, here's what I use and why:

Boomerang. Gives standard file dialog boxes the intelligence and shortcuts that Apple should have provided. Especially useful with large-capacity hard disks that have lots of files and folders.

ATM. See my July column for details.

Suitcase II or MasterJuggler. Again, see my July column. Choose whichever one suits your style of work best, and use it to organize your fonts and DAs. Either can help keep the size of your System file



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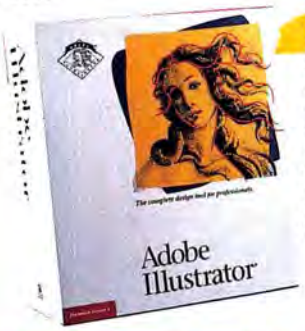
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to a minimum at all times, which optimizes the amount of memory available for applications and data. And don't automatically have them load all fonts and DAs all the time, as that defeats the purpose. I have one font suitcase containing laser-printer fonts, another with fonts for my newsletter, another with decorative fonts I use infrequently, and so on. I try to keep open only those suitcases that contain things I'm currently using.

SAM or Virex. Viruses have twice tried to take over my hard disk. Both times SAM has stopped them. Ever had to rebuild a 210-megabyte hard disk? Don't learn the hard way.

Pyro! or AfterDark. If you leave your machine on for long periods and use it only intermittently (I leave mine on when I go out to lunch, for example), get a screen saver and use it. The biggest problem with the Mac is that the menu bar at the top of the display is almost always there, and even though monitors have gotten better, there is still some potential for a constant image to be etched permanently into the display (called burn-in), especially on monochrome monitors.

SuperClock. I like knowing what time it is (so that I know how late I really am), and SuperClock is always there at the right side of my menu bar. Not a necessity, but nice.

On Cue. Even though On Cue gets senile once in a while, forcing me to rebuild the application launch list, it makes it very convenient to start up applications and data files I use frequently (and that might be buried in folders within folders). Think of it as a menu.

INITPicker. Even if you have only a few basic INITs, such as the ones I've just mentioned, someday you'll need to disable or reorder some of them. INITPicker does just that, with a straightforwardness that's refreshing to find in Mac software.

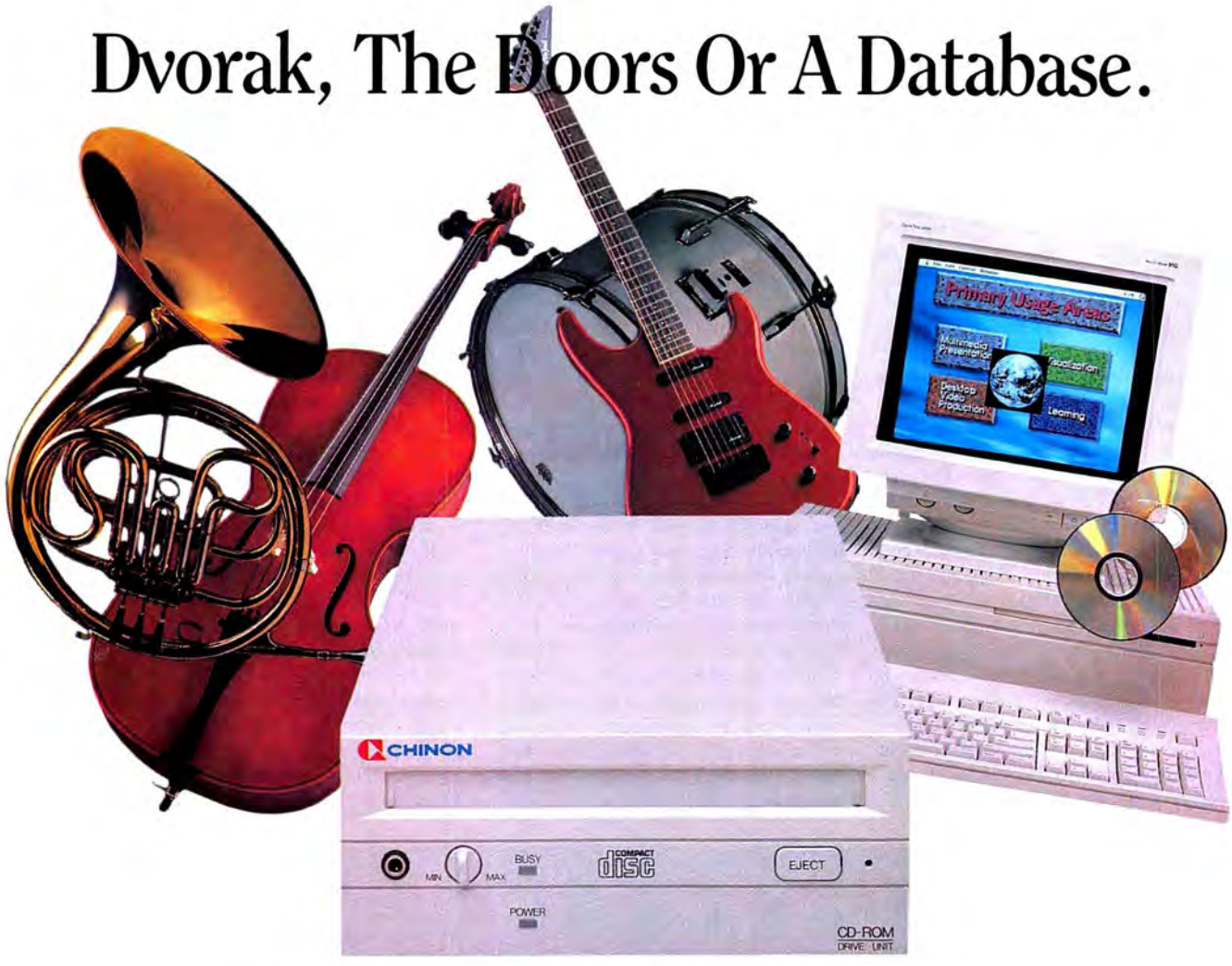
Of course, these are just my opinions. I'm sure I'm going to get piles of indignant letters from marketing managers, users, lobbyists, and who-knows-who-else telling me I left out their favorite indispensible utility.

Why does the Apple logo flash in the upper left corner of the menu bar? It's funny how soon we forget. I too have pondered this problem at length, only to remember that that's what happens when the Alarm Clock (DA) goes off. Now wait a minute, I didn't set the alarm clock! True, but some program probably managed to wander off in memory and stomp on the PRAM (parameter RAM).

I'm taking my Macintosh overseas. How do I power it? It depends on what equipment you have. Most recent Apple-labeled products are self-configuring within the voltage and frequency ranges of most countries' power output (50 – 60Hz, 100 – 240 volts). Products that are self-configuring include the Mac SE, SE/30, II, IIx, IIcx, IIci, IIfx, and Portable; RGB and HiRes Mono monitors; the LaserWriter II; and HD20, 40, and 80 drives. (Some range restrictions apply to certain models, notably the older IIs, so check your manual to be sure.) For these products, your biggest problem is finding the right cables and adapters. For other Apple products, notably the Plus

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and older Macs, you must use a step-down isolator transformer (Apple recommends one that handles 500 watts).

Why does my Mac keep crashing? This is, of course, the number 1 question experts get asked. The simple answer is that someone, somewhere, is doing something wrong. To determine the answer, look at the "Crash Course" sidebar.

When my system has been stable (no new software added or changed) for any length of time, crashes become so infrequent as to be almost unnoticeable. If that's not your case, something's wrong and you need to find it and fix it.

Obviously, there are many, many more questions that could be answered. CompuServe users shouldn't hesitate to ask questions on Zmac. The rest of you? Well, try your local user group or dealer, or look for computer consultants in the phone book. I'm not betting that Apple will figure out how to provide direct customer support in the near future, so you'd better find an alternative source.

In the remaining space here, I'd like to address some gripes to the muckamucks at Apple:

Telephone-support lines. Apple needs to respond directly to customers — all customers, not just *Fortune* 500 accounts. Assuming that we actually get to talk to a reasonably intelligent (trained) human during the entire time we're on-line, most of us probably wouldn't even mind paying a small fee (the 900-number idea, for example). It's not that we're averse to paying for support; it's that we've seen nothing to date that indicates you can even begin to answer our questions, so what would we be paying for?

Support-oriented publication. No, starting an Apple user publication would not compete with *MacUser*. At least, not if you start the publication we need: one that talks about Apple-labeled products with an emphasis on update information, compatibility information, problem solving, interaction effects, long-term-use issues, and the like. If you need a model, check out *Lotus* or *Aldus* magazine. The point is to avoid spending any time trying to sell us anything (We've already bought, remember? We might buy more if we like what we've got.) and concentrate on providing useful information.

Diagnostics. I can't begin to count the number of times I — or another Mac user I know — have tried to pin down a crash or other problem and would have liked to be able to isolate whether it was a hardware or software problem.

I've seen the diagnostics you provide dealers, and they're pretty good. Why don't you sell them to users? Are you afraid they'll begin tinkering with hardware? If so, why does this frighten you? When their soldering guns destroy the motherboard, that's just another motherboard you'll be able to sell. Do you think, perhaps, that your users are too dumb to use the diagnostics?

Sorry, but I've run into more than a handful of dealer "repairmen" who couldn't even read the messages on the screen — intelligent users aren't going to be able to ignore little things such as a picture of a motherboard with a big *X*



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through it. Moreover, I've heard too many horror stories of people taking a Mac into a dealer and the dealer ending up selling them a new motherboard and an AppleCare package when the real problem turned out to be the wrong System software or a bad cable. By keeping the diagnostics in dealers' back rooms, you encourage this kind of thievery.

Ombudsman. I know the ombudsman idea has been floating around Apple for some time and that you supposedly have such a beast ensconced somewhere in one of your 419 buildings. It's pretty obvious, however, that you don't want anyone to find this person, department, or whatever. If you did, we would all see the number to call (or the mail stop to write to) in big red letters in the very front of every Apple product's manual (as in, "If your dealer cannot satisfactorily resolve any problems you may have with your Apple-labeled equipment, please call . . . ").

Action, not PR. I'm tired of hearing about System 7 (you've been telling me about it for almost a year now). Meanwhile, I hear hardly a thing about the differences between System 6.0.1, 6.0.2, 6.0.3, 6.0.4, and 6.0.5. And don't try to tell me that the new releases were mainly for new machines. Sure they were, but what about those 100-plus bugs you fixed along the way? Don't you think some of us might have run into them? I'm also pretty nauseated to hear your top officers consistently tell audiences everywhere that "Apple is going to be a world-class provider of customer support." Frankly, your actions to date show that you don't have the foggiest notion of what support is really about.

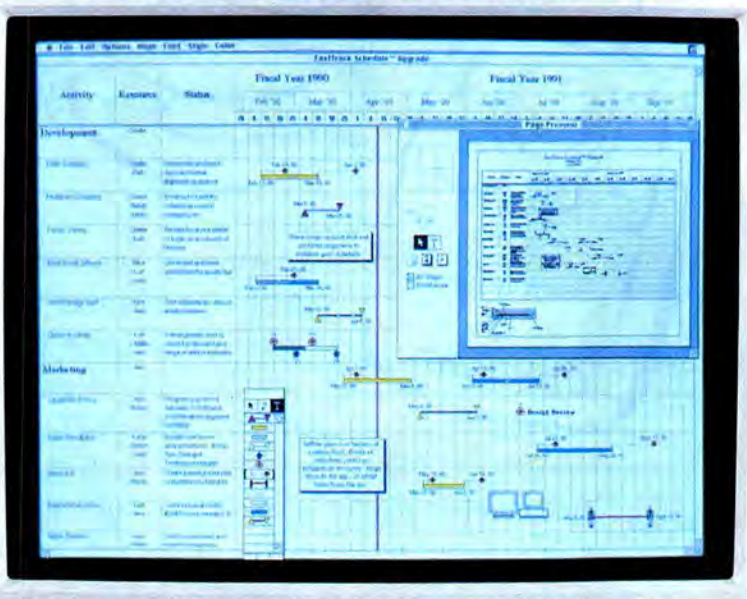
Once in a while you do something that rewards the faithful — the pricing of the II-to-IIfx upgrade, for instance — but most of the time, you ignore our needs. For six years now, you've had at least one registration card from me for a Mac product. In that time, you've sent me exactly one mailing: a two-page letter that described one upgrade choice, promoted five new products you wanted me to buy, and attempted — unsuccessfully — to help me make sense of what operating-system version I should be using.

Finally, when you've been faced with a problem you needed to fix (the original Mac power supply/video board, the original ImageWriter IILQ, the color monitor, the Quantum drives, and so on), you seem to go out of your way to keep your repair and replacement policies a secret from users (and from dealers who don't read every line of every missive you send them). Fortunately, a few alert publications and bulletin boards keep you honest and disseminate the information, but you've had very little to do with that.

Action, folks, we demand action! (If you readers agree, write to me in care of *MacUser*, and I'll see that your letters are forwarded to the appropriate lethargic Apple employee.)

Thom Hogan is taking a sabbatical from things that others might call work (this column excepted). He can be reached on CompuServe at account 72511,140.

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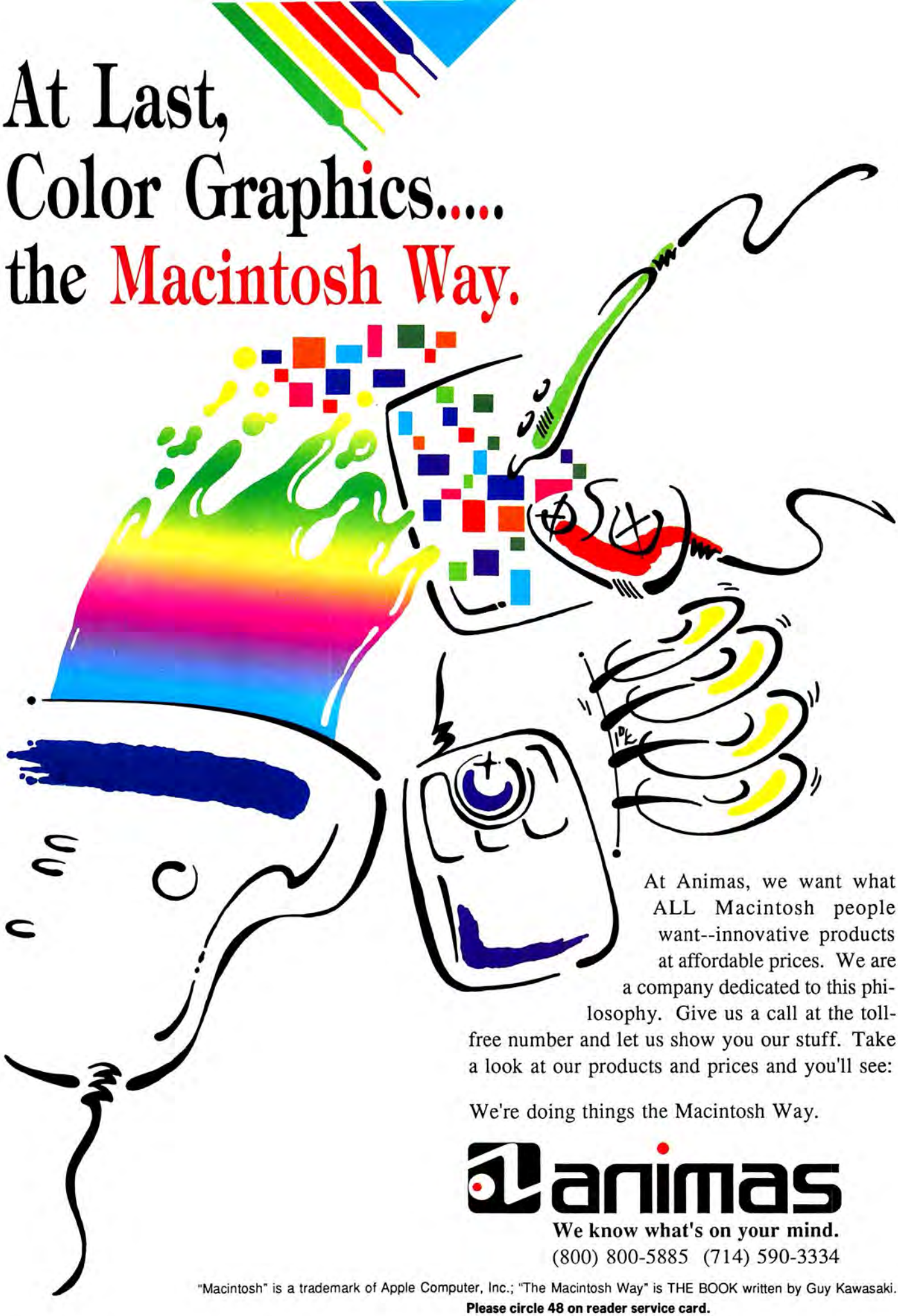
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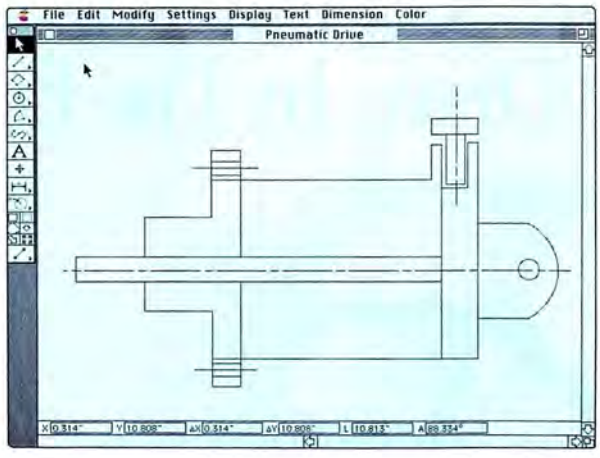
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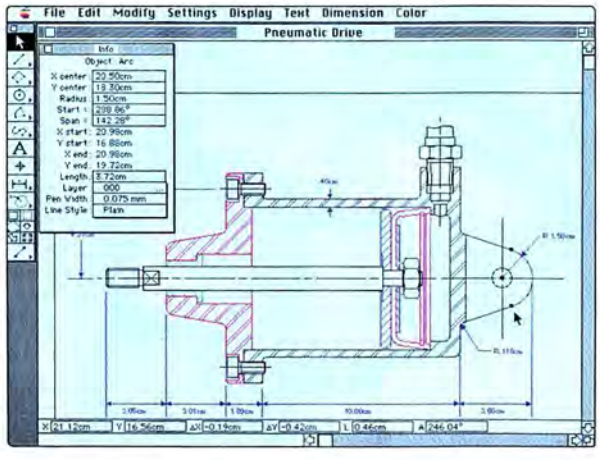
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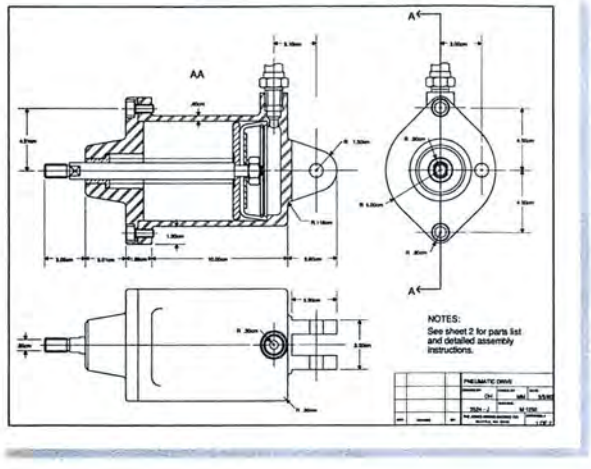
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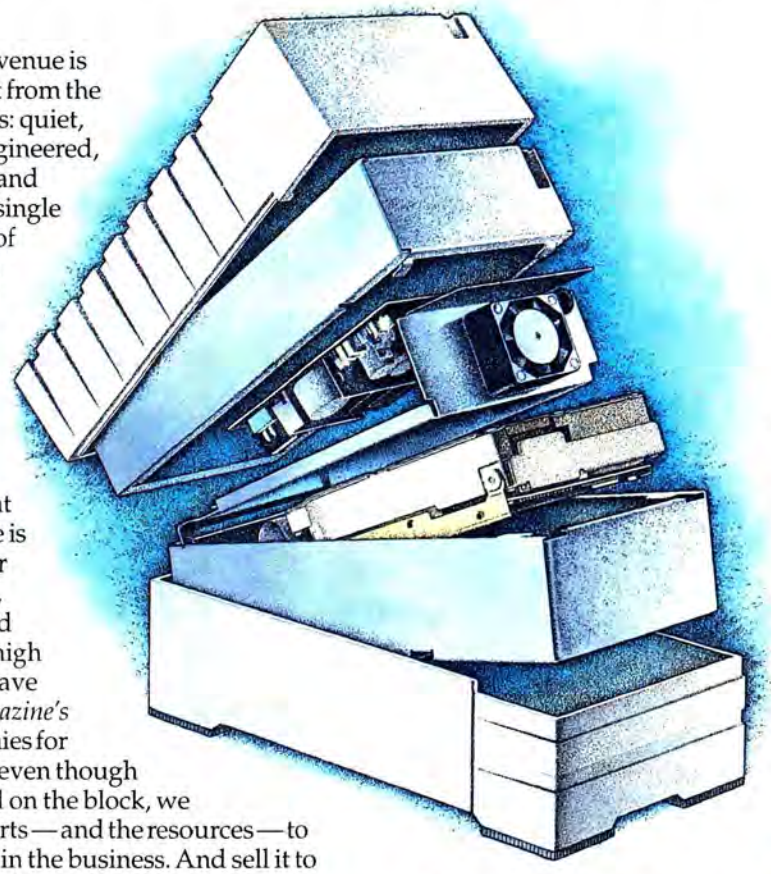
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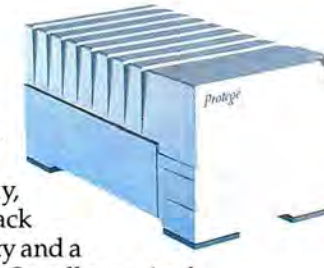


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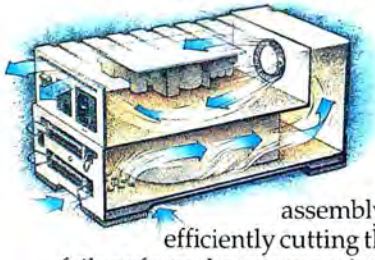


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The File System

Computers need data, and data comes in files. This month — in preparation for our next project — we examine how the Mac's file system works.

Figure 1: Inside a Hard Disk

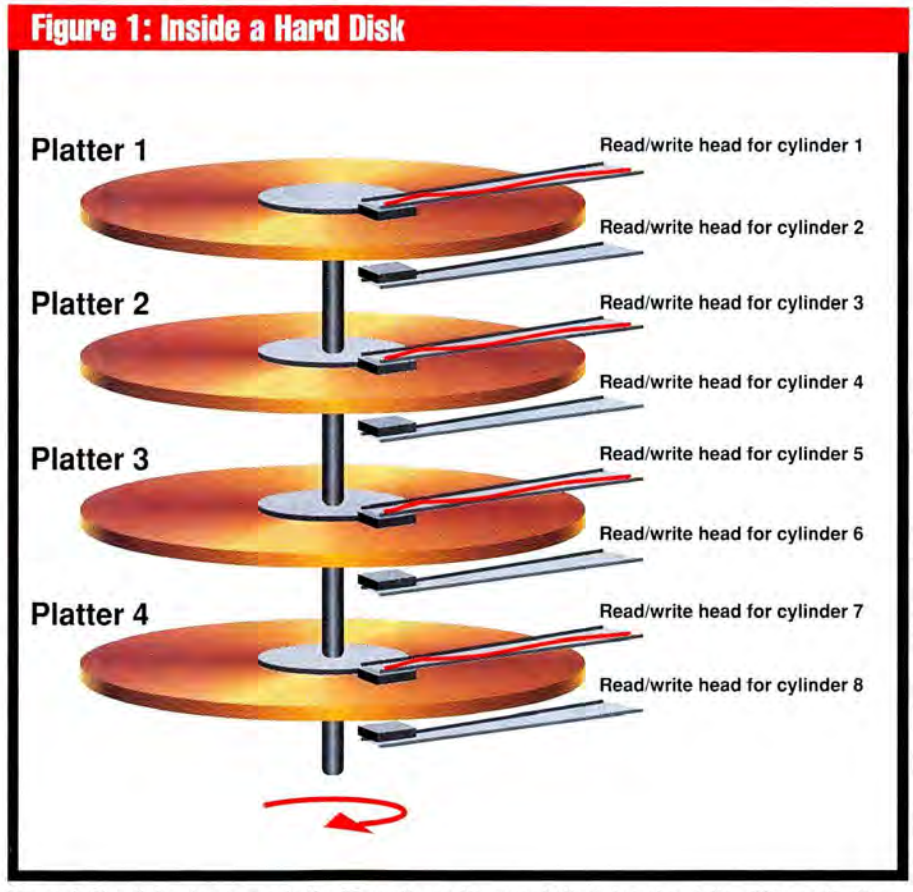


Figure 1: The disk spins on a spindle. Magnetic media cover both plates of a platter. The read/write heads ride on an arm that seeks from track to track.

Have you ever seen a generic document icon on your desktop and wondered how it got there and what's inside? Chances are that it belongs to an application you no longer use and have discarded.

Browser, a utility that we'll be developing here, can open any file that has a data fork and display its contents in a document window. This month, we're going to lay the groundwork for Browser by examining the Macintosh file system and discussing some basic File Manager concepts.

The File System

Let's begin our examination of the file system from the ground up, at the hardware level. The physical file system is based on a collection of disks and their contents. Disks can be *fixed* (a Winchester hard disk, for example) or *removable* (a 3.5-inch floppy disk). In strict hardware-hacker terminology, the *disk* contains the recording medium, the *drive* spins the disk and reads and writes the data, and the *controller* tells the drive how to read and write.

At the bottom of it all is the recording medium, which is a coating of electromagnetically sensitive material. This medium resides

By Kurt W. G. Matthies and Thom Hogan



Figure 2: Tracks and Sectors

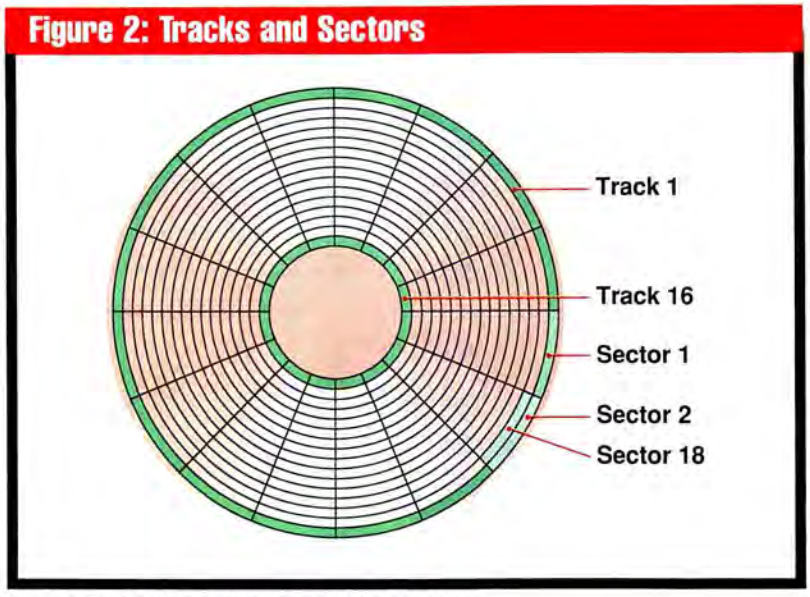


Figure 2: Each platter is divided into tracks and sectors.

Figure 3: A File as a Stream of Bytes

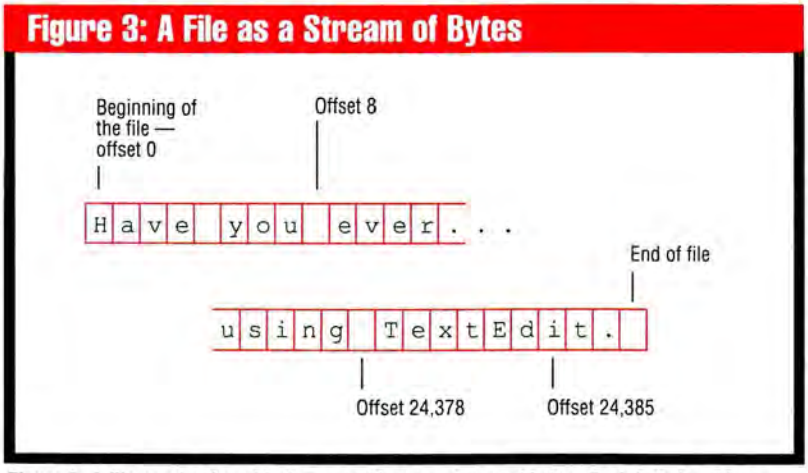


Figure 3: A file can be thought of as a continuous stream of bytes. Each byte is addressable as an offset from the beginning of the file.

Figure 4: Logical and Physical End of File

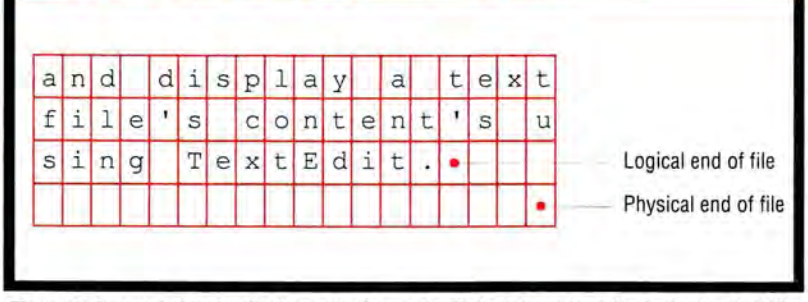


Figure 4: A sample block, albeit small, shows the file's data ends at the logical end of file. The last byte allocated to the file is the physical end of file.

on platters, each of which has two sides, called *cylinders*. Formatting a disk divides the cylinders into *tracks*, which run in concentric rings around the surface of the cylinder, and *sectors*, which are formed from the intersection of pie-slice divisions of the disk's surface and the track boundaries. A sector usually contains 512 bytes of data and a track generally has 16 or 17 sectors, but the number of tracks on a cylinder varies from disk to disk. Figures 1 and 2 illustrate the physical organization of disk real estate.

The hardware controller manages the cylinders, tracks, and sectors. A disk-driver program, which is part of the System software, mediates the interaction between hardware and software. To the disk driver, drives are known as *volumes*.

Disk Formatting

Formatting of a disk occurs in two stages. First, a low-level format lays down the tracks and sectors. The second stage lays down the file-system information — the disk driver creates a *volume record* on the disk that describes its size, a directory that holds references to files, and a list of free *blocks*.

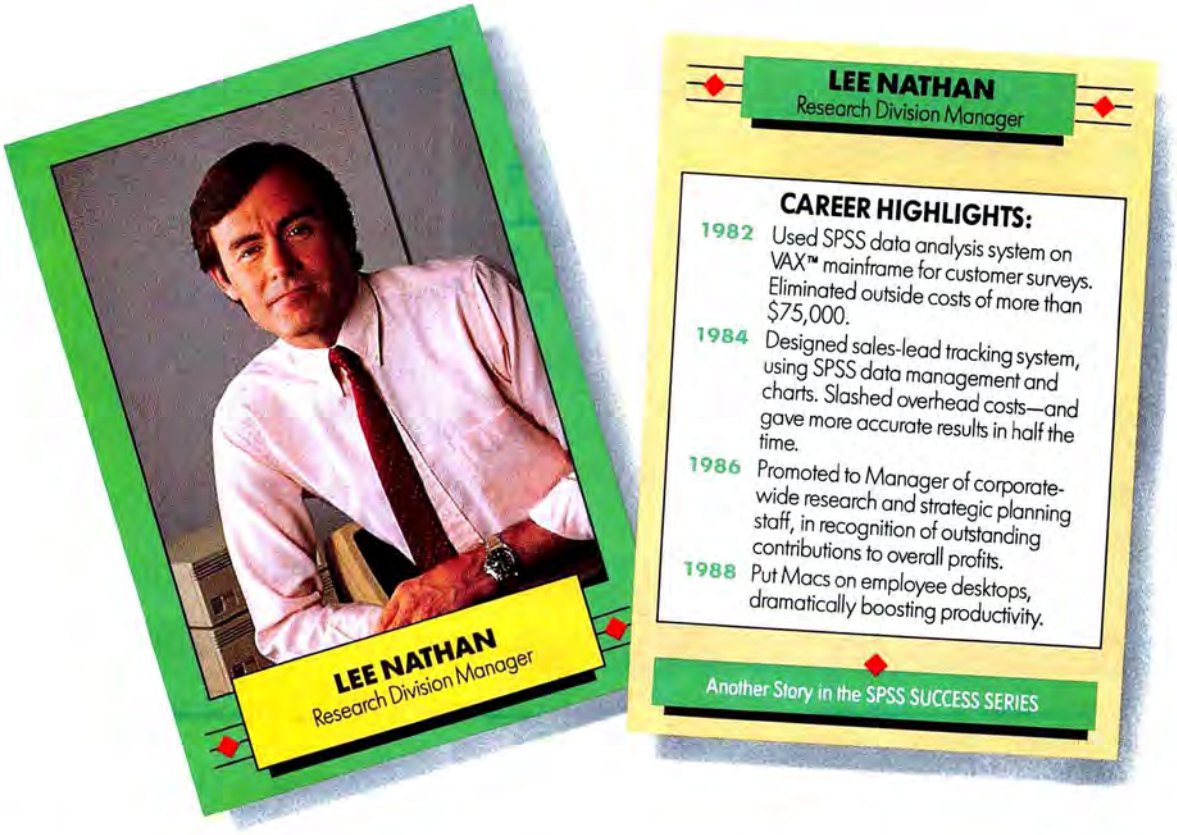
A block is a logical sector. Whereas a physical sector contains 512 bytes of data, a block may contain 512, 1,024, 1,536, or another multiple of the physical sector size. A block is the smallest unit of data available on the drive — even if you are requesting only one byte of the file, the driver will always read an entire block into RAM. Blocks are sequential — they run from 0 to *n* and cover the entire hard disk.

This layered approach to hardware and software insulates application programmers from the details at the hardware and driver level. Blocks are of great interest to system programmers who write device drivers. We will leave them to the initiated, however, as we're more interested in the next level of file-system organization.

The Macintosh file system and the File Manager routines create files and folders from blocks. The Finder, the user interface to the Mac operating system, uses the File Manager routines to simulate the desktop metaphor. So, for example, when you drag a file from a hard-disk folder onto a 3.5-inch disk's icon, the Finder is calling File Manager routines that in turn call the disk driver to read a list of blocks on the source disk. At the same time, the disk driver is allocating blocks on the

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disk for the destination file. The whir of the disk drive and the movement of the read/write-arm stepper motors are acoustic evidence that all is working on the physical level.

Files

We use files every day. Each of the icons on your desktop represents a collection of data known as a file. Mac files have two parts — the data fork and the resource fork — but you may find it easier to think of these forks as two files in one. The resource fork is a collection of resources that are accessed through Resource Manager routines. The data fork, which is application-specific, is used to hold application data.

As a programmer, you should think of a file as an ordered list of bytes. Each file has a beginning and an end and therefore a size, in bytes. Each byte in a file is addressable as an offset from the first byte of the file. In Mac documentation, this offset is called the file's *mark*. If the mark is at offset 0, a read gets you the first byte in the file. When the mark is at the last byte in the file — the end of file (eof) — a write appends the characters to the file. The last byte in a file is the character before the eof. Figure 3 illustrates this concept of a file as a stream.

The blocks of a file are of a fixed size, and depending on the file's size, there might be extra, unused bytes after the eof. For example, if a block is 512 bytes and a file contains 3,900 bytes of data, 4,096 bytes will be allocated to the file (eight blocks) and so 196 bytes will remain unused. You may have noticed that the Get Info dialog box reports the size of a file as something like "3,900 bytes used, 4K on disk." To reconcile this difference, *Inside Macintosh* refers to the logical eof, which in our case is 3,900, and the *physical* eof, which is the size in bytes occupied by the blocks allocated to the file, or 4,096 in our example. Figure 4 illustrates logical and physical eofs. The logical eof is of greater interest for appending data to a file, so when we refer to the eof, we'll be talking about the logical eof.

File Signatures

The Resource Manager maintains data about the file type and creator for each file the Finder uses. This information binds an icon to a file. The file-type value identifies the kind of data the file contains, and for Mac applications, it is always `APPL`. Browser is interested in files of

Table 1: Common Macintosh File Signatures

Application	File creator	File type
System	MACS	ZSYS
Finder	MACS	FNDR
MacWrite	MACA	APPL
MacPaint	MPNT	APPL
Word	MSWD	APPL
PageMaker*	ALD3	APPL
Tycho Table Maker	Tyco	APPL

*Version 3.0 and later

Figure 5: A Hierarchical File System

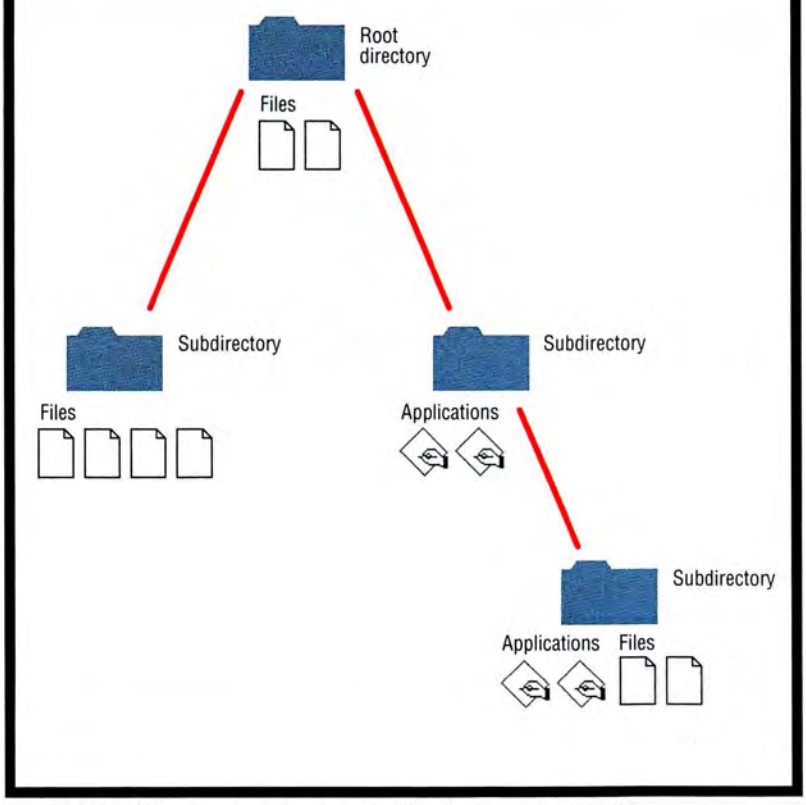


Figure 5: The file system is a hierarchy of folders, files, and applications.

type **TEXT**, which, as you might imagine, are ASCII files.

The file-creator value identifies the application that created the file. It is sometimes called the file signature in Apple's documentation. The signature data is of type **OSType**, defined in Pascal as a **PACKED ARRAY**, and contains two characters per byte. This unusual format is defined in THINK C as type **long** and is declared as a string with the single-quote character, as in **'KWGM'**, which translates into the 32-bit hexadecimal long word **0x4B57474D**.

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Example 1: `PBHGetFInfo` Documentation

```
OSErr PBHGetInfo ( HParamBlkPtr paramBlock, Boolean asynch );

Parameter Block

   -->   12      ioCompletion     pointer
   <--   16      ioResult         word
   <->   18      ioNamePtr        pointer
   -->   22      ioVRefNum        word
   <--   24      ioFRefNum        word
   -->   28      ioFDirIndex      word
   <--   30      ioFlAttrib       byte
   <--   32      ioFlFndrInfo     16 bytes
   <->   48      ioDirID          long word
   <--   52      ioFlStBlk        word
   <--   54      ioFlLgLen        long word
   <--   58      ioFlPyLen        long word
   <--   62      ioFlRStBlk       word
   <--   64      ioFlLgLen        long word
   <--   68      ioFlRPyLen       long word
   <--   72      ioFlCrDat        long word
   <--   76      ioFlMdDat        long word
```

Example 2: `GetFInfo` Declaration

```
OSErr GetFInfo (Str255 filename, int volRefNum, FInfo fndrInfo);

typedef struct FInfo
{
   OSType    fdType,
             fdCreator;
   int       fdFlags;
   Point     fdLocation;
```

Note that a normal string, declared with double quotes, is written as `"KWGM"` and translates into the 5-byte hexadecimal sequence `0x4B`, `0x57`, `0x47`, `0x4D`, and `0x00`.

Table 1 lists some examples of standard file types and signatures.

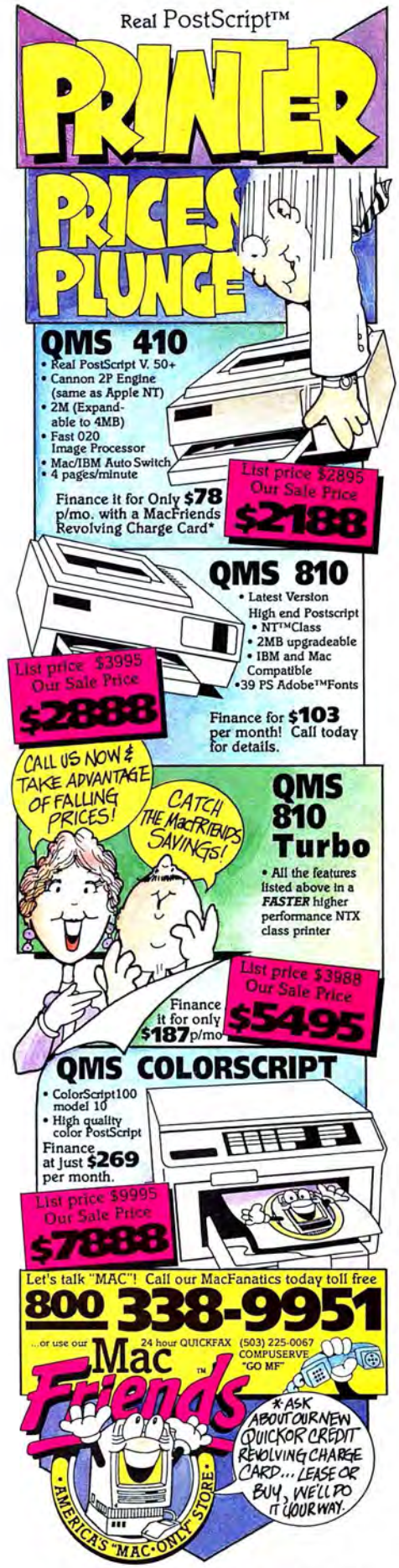
Volumes

The file system considers each drive in the system to be a volume. The volume information resides on block 2 of the disk, and again, the information it contains is primarily the domain of System programmers. Application programmers are interested in volumes for one reason only: to locate files. Volumes are used as part of the access path to a file. In fact, a volume ID and filename are all that's needed to open a file.

Directories

Directories and subdirectories are the internal structures that refer to groupings of files represented by folders on your desktop. Old-timers whose experience extends back to the 1985 Mac 128K and 512K models remember when only one level of directory was allowed — the so-called flat-file system. Folders within folders were supported with the advent of the 128K ROMs of the Mac Plus, creating the UNIX-like hierarchical file system of today's Mac software.

This radical change in the file system's structure caused a rewrite of the File Manager documentation. As a result, the File Manager documentation in *Inside Macintosh*, Volume II, is obsolete, having been superseded by the information in Volume IV.



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The file system is hierarchical. At the top is the root directory, which is itself a volume. This is an important concept: In a hierarchical file system, directories are logical volumes. Each directory or folder is considered a volume, so File Manager routines that accept a volume ID as an argument can find a file in the hierarchical system.

The hierarchical system of the Macintosh also supports the concept of a "working directory," which is the folder you currently are working in, and provides an alternative method for accessing files in a folder. This working directory is set to the current folder whenever a program is launched from the Finder and, because of the relationship between volumes and directories, the current directory is changed with calls that set the current volume.

The File Manager

The File Manager, which is responsible for this file and folder hocus-pocus, is probably the most powerful of all the collections in the Toolbox. But this power comes at a high cost. The File Manager documentation is voluminous, confusing, and contradictory — there are four ways to specify a file, three variants of the standard I/O parameter block, two levels of using the File Manager, and more information than one person would want to know about any file system. Although navigating through the file system may be a breeze, working your way through the documentation is an ordeal. Let's start at the bottom of this mess.

Application programmers are interested in volumes for one reason: to locate files.

As a novice, your worst choice is the low-level interface to the File Manager. The low-level routines have the prefix `PB`, as in `PBRead`, `PBWrite`, and `PBGetEOF`, to distinguish them from the high-level ones. The `PB` reminds you that you're using a variant of the Device Manager parameter block to pass data into and out of these routines.

To add to the confusion, when the change was made in 1986 to support the new file system, each primary routine was doubled with a hierarchical routine. So, we have a `PBOpen` and a `PBHOpen`, and we have a `PBGetFInfo` as well as a `PBHGetFInfo`.

Why is this the worst choice? The entire interface is based on the concept of a variant-record parameter block. The fields of the parameter block change, depending on what kind of File Manager procedure is being called, and the input requirements are different for each call. The entire scheme is something out of the old Motorola 6800 Exorcizer days.

The parameter block contains everything you want to know about a volume, file, or access path, depending on the variant. Each `PB` routine has its own set of input and output parameters, so you

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can't work with these routines without a copy of *Inside Macintosh* open on the desk next to you. Even then, you're in deep muck.

Example 1 is an excerpt from the documentation for the call `PBHGetFInfo`, which returns information about a file in the hierarchical file system and provides enough information to give you a feel for this low-level documentation.

Problem 1: Note the arrows. The ones that point right (`-->`) specify inputs to the routine. The ones pointing left (`<--`) specify outputs. The ones pointing both ways (`<->`) specify data that passes into and out of the routine — whatever that means.

As a novice, your worst choice is the low-level interface to the File Manager.

Problem 2: Which variant of the parameter block do you use? Notice the `Fl` in the name of the fields `ioFlAttrib`, `ioFlCrDat`, and so on. This `Fl` and the fact that you're getting file information is the tip-off that you use the `fileParam` variant. There are two other variants to use — `ioParam`, which accesses open files, and `volParam`, which returns volume information.

Problem 3: Look at the numbers column — 12, 16, 18, ... These numbers are offsets of the field from the beginning of the record, which should tip you off — these calls are for assembly-language programmers, and if you're going to do your work down here, you'd better know what you're doing.

The routine in Example 1 returns a hodgepodge of data about a file. First, it returns open-file and -directory numbers. Second, in the `ioFlFndrInfo` field, it returns data about the file's `FInfo` structure, or Finder information. Third, it returns the file's data- and resource-fork sizes and logical and physical end-of-file marks. Fourth, it returns the file's creation and modification times.

Our problem with this low-level File Manager interface is that it's really a Device Manager interface, and as proponents of *layered* design, we believe that applications should not be mucking around with devices.

Fortunately, there is an alternative: the high-level interface to the File Manager. For most applications, its routines are sufficient, and they're easier to use. The high-level routines are the ones that don't begin with `PB`. Some of them begin with the prefix `FS`, as in `FSOpen`, `FSRead`, and `FSWrite`; others, such as `Create`, `GetEOF`, and `SetVol`, are named in accordance with their action.

The high-level interface provides 80 percent of the functionality of the low-level interface, and the procedures that go with them are easier to understand. They're more modular too — there are usually two or three high-levels calls that can get you the same data as the parameter-block call. For example, `GetFInfo`, which returns the Finder-information data in the `FInfo` data structure and is shown in Example 2, returns the same data that is contained in the `ioFlFndrInfo` field of `ioParamBlk`. The frustrating fact is that if you want other information, such as the file size, you need to call the low-level function.

There is a third, THINK C alternative to the low-level interface. The full ANSI C stdio library is supported by the compiler. This library has more functionality than the high-level routines and is handy if you want your I/O modules to maintain compatibility with non-Mac systems. These routines are based around the standard file streams. THINK C provides the same interface as you would find in a UNIX or DOS environment, along with sources. If you're familiar with these routines, studying their sources is a great way to learn the low-level File Manager interface. In fact, if it weren't our charter to teach the Mac way of doing things in this column, we'd recommend that you, as new programmers, use this library for your file I/O.

File-System Etiquette

The file system has lots of flexibility. The number of files or folders it contains is limited only by the size of the disk, and files may share common names if they are in different folders. You can copy files, move them from one folder to another, or delete them.

To keep things straight, the File Manager maintains a complex, cross-referenced set of data structures on-disk and in memory. Any access to a file must initially be set up by the File Manager, so that all the structures that relate to the file are available.



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This *access path* to the file is created when a file is opened. Opening a file returns a *file reference number* that is used for all future file accesses during the time that the file is open.

Open files can be read, written, locked, and unlocked. Reading a file is how you retrieve its data, writing is how you add to it or change it, locking is how you retain exclusive access to a piece of a file in a multiuser environment, and unlocking reverses the process.

Once you've finished with the file, closing it writes all pending data to it, a process called *flushing*, and frees the access-path structures. The file reference number isn't valid after the file's been closed, and further reading or writing using the access path produces an error.

Next Month

Just when we have enough background, we're out of space. Next month we'll jump right in and open a file; read it into a buffer; and display an ASCII file's text on-screen, using TextEdit.

Bug Alert!

Oops — one of those nasty little creatures slipped in! It's in Generic App, part 3, referred to in the July '90 issue (page 238). The bug occurs when the application has more than two windows open.

I never intended this version of the application to have more than two windows open at a time — the application existed only to demonstrate scrolling. But I didn't thoroughly guard against this possibility. So if you have this code, here's a fix for the file MenuUtil.c. You add the fix to the function `fixMenus()`, just after the line

```
DisableItem (gEditMenu, kClearItem);
```

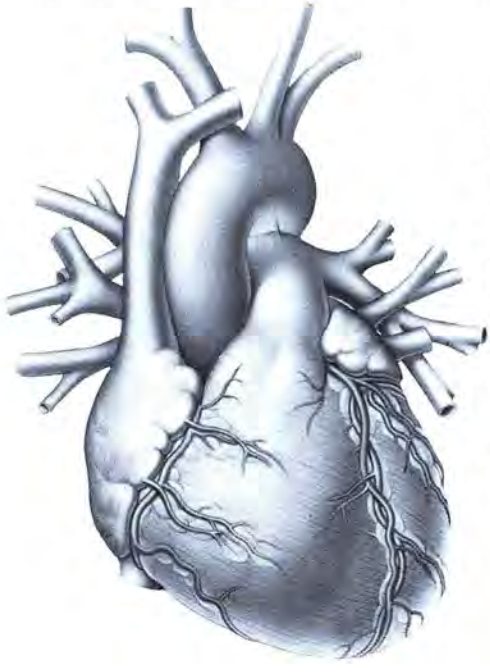
You can see where the old test for **ISPICTDOC** has been taken out with the `#if 0`. Example A contains the fix; it should do the trick. Report any bugs to me, c/o *MacUser* or at 72511,105 on Zmac.

— Kurt Matthies

Example A: Bug Fix

```
/* ### kwgm 6.20.90 */
if (gNumOpenDocs >= 2)
{
   DisableItem (gDocTypeMenu, kPictDocItem);
   DisableItem (gDocTypeMenu, kTextDocItem);
}
else if (ISPICTDOC(theDoc))
#if 0
   if (ISPICTDOC(theDoc))
#endif
/* ### kwgm 6.20.90 */
```


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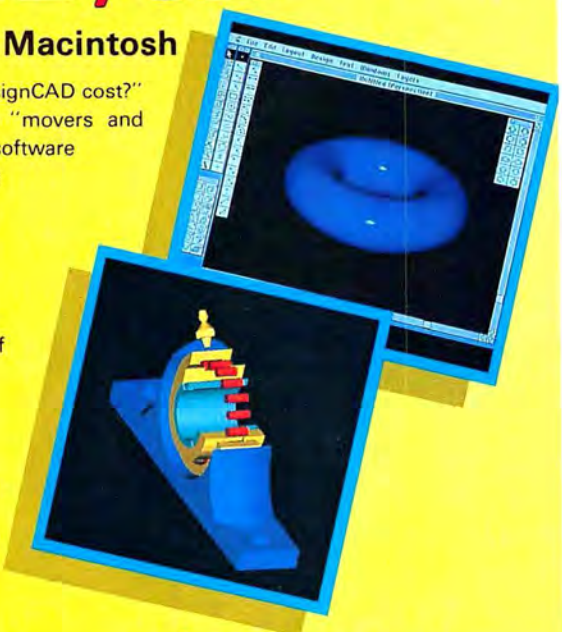
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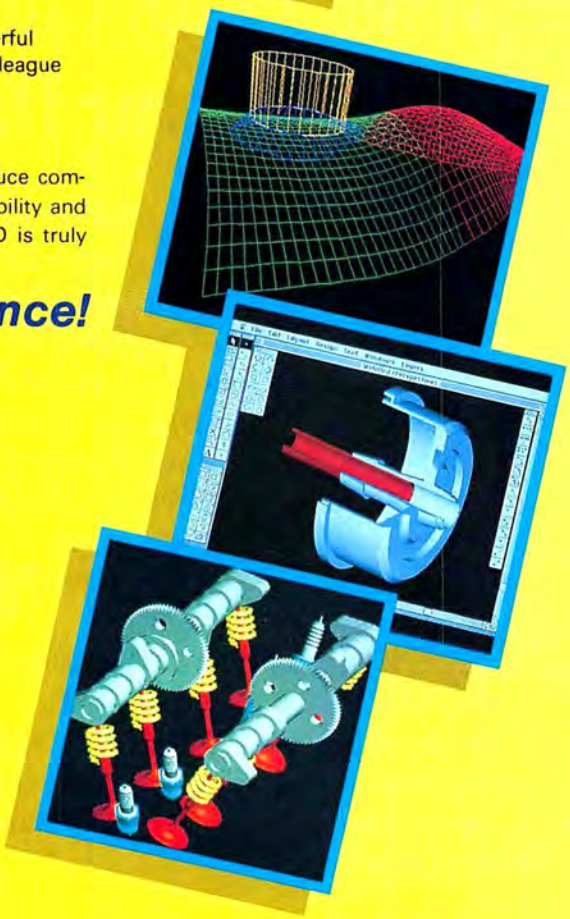
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DesignStudio

In DesignStudio you can tighten all the boldface type in a document simultaneously or make virtually any kind of adjustment to any kind of type style by using style sheets in conjunction with the program's search-and-replace function.

For example, here's how to tighten all the boldface type in a document:

1. Create a style sheet with tracking and other attributes set to whatever you want.

2. Call up the Replace dialog box, and click on Use Format in the Find section. You then get another dialog box that lets you set boldface.

3. In the Replace section, click on Stylesheet and scroll to the style sheet you've just created.

4. Click on Document in the Limit Search To box, and then click on Start Search.

All the boldface type in the document instantly tightens to the degree that you've specified. And if you want to further adjust the boldface, simply make the change in the style sheet.

Jon Marken
Hampden-Sydney, VA

Adobe Illustrator 88

When using Adobe Illustrator 88, you can easily become frustrated at having to cycle repeatedly through layers of graphics objects to get to an object at the back of an illustration. This is especially true when you use the masking feature. You can avoid this frustration by creating identifiers, or "handles," for the objects in your multilayered illustration.

Start by creating a short, straight line with the pen tool. Set its fill and stroke to None on the Style menu, and group it. This is one of your handles. Make several copies, and set

Tip of the Month

QuarkXPress

QuarkXPress, like most other word-processing and page-layout programs, doesn't let you mix two style sheets in the same paragraph. But let's say you have a catalog whose layout needs to look like that in Figure 1a.

In this case, you might set up a format for the hanging indent in New Century Schoolbook and then painstakingly select and change the part numbers to Helvetica Bold.

A quicker way is to set up a style sheet for the hanging indent and a separate style sheet for the part number. Then instead of running the part number and the description together, as they will eventually appear, insert some unique combination of paragraph returns (and other characters if necessary) between the part number and the description so you can search for and replace it later.

Select the entire text, and format it as a description (with hanging indents) by using your first style sheet. Now click on each of the part numbers and — with the function-key equivalents that QuarkXPress lets you assign to style sheets — format all the part numbers with their own style sheet.

You then have a document that looks like Figure 1b. (I've used two carriage returns as my separator, knowing that nowhere else in my document do I ever use two carriage returns together. You can use any combination, as long as it's unique and includes at least one carriage return.)

Now use QuarkXPress' Edit Find/Change menu option to replace your separator (in this case, two carriage returns) with spaces or whatever else you want to have between the part number and the description.

When you've finished, you'll see that the description and the part number each have their own style, just as in Figure 1a. QuarkXPress, unlike PageMaker and Word, doesn't store styles in the paragraph marker, so when you eliminate the paragraph marker between dissimilar styles, QuarkXPress simply juxtaposes the styles rather than replacing one with the other.

Because all formatting options in the style sheet remain with the text itself, you can have different fonts, styles, formats, and you-name-it, and QuarkXPress will preserve them.

Greg Raven
Los Angeles, CA

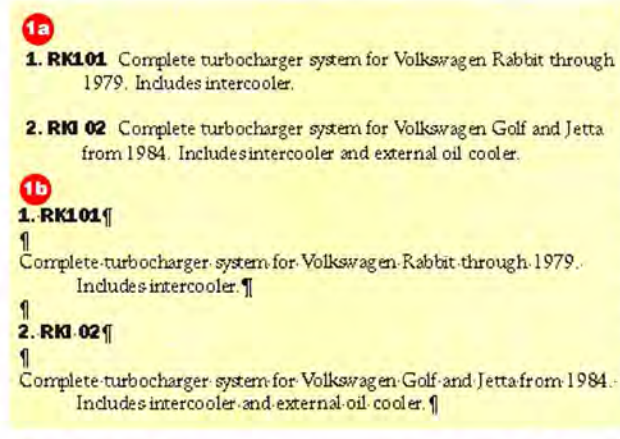
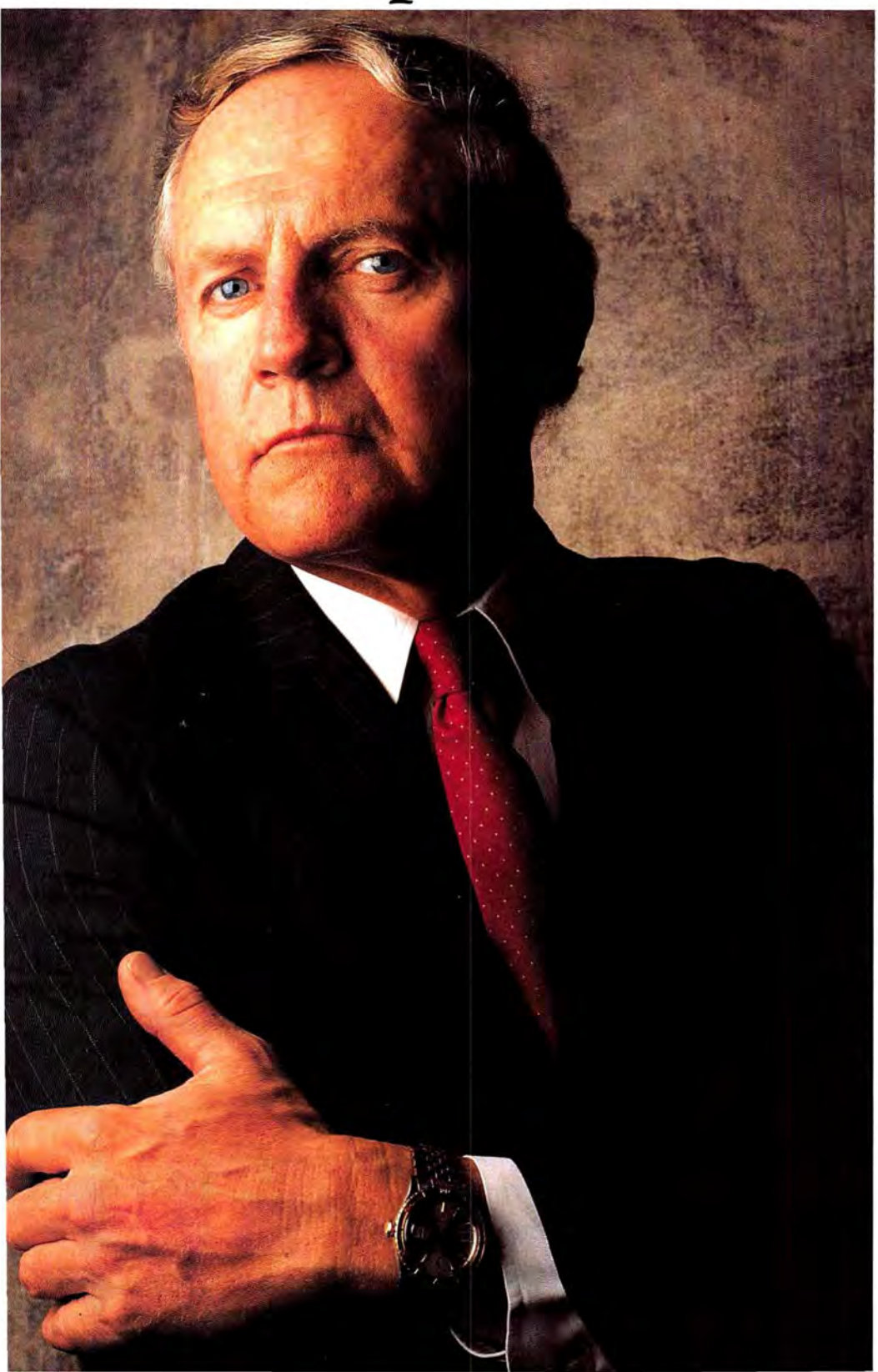


Figure 1: Unlike Word and PageMaker, QuarkXPress doesn't replace the style of one paragraph with that of another if you combine them but, rather, juxtaposes the two styles. To mix different text styles within single paragraphs (1a), you can format paragraphs with carriage returns (1b) and then globally combine them.

Compiled by Gregory Wasson

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Adobe Illustrator 88

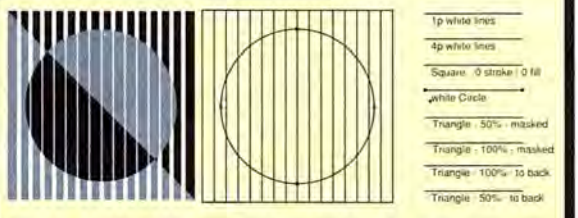


Figure 2: Keep track of objects in complex Illustrator 88 graphics such as this one by creating nonprinting "handles" that let you easily select all the objects.

them aside. As your work progresses, group the object(s) in a layer and move one of the handles you've created toward the perimeter of the illustration. Group the handle to the object. Now, no matter where the object occurs in the layering of the illustration, you can select it quickly and easily. If you move an object away from the illustration, using its handle, in order to make adjustments to any of its attributes (size, shape, fill, or stroke), you can return it to its position in the illustration, after regrouping, without losing its layered position.

For further clarity, you may wish to describe the attributes of an object in a layer, especially if objects in different layers are identical. When you create your first handle, create some dummy text and place it underneath the handle. Do not group the text to the handle at this point, but remember to set the fill and stroke of both handle and text to None. Select the handle and text, and make copies. When you're prepared to group a handle to an object, move a text/handle combination toward the illustration and change the dummy text to a description of the object. Then group the text to the handle and the handle to the object (see Figure 2).

These descriptive handles come in handy when you're trying to keep track of objects, especially when you need to make adjustments to a complex illustration you created weeks or months ago.

Jeff Negran
New Brunswick, NJ

StuffIt

Simply pressing Command-. (period — the usual method in most instances) doesn't stop the stuffing/unstuffing operation in StuffIt 1.5.1. Instead, you need to hold down Command-. continuously until the operation has stopped.

Paul P. Villasenor
Newark, DE

PageMaker

In a recent Tip Sheet (June '90, page 293), Bob Jones, of Salt Lake City, Utah, stated that he couldn't use his numeric keypad to enter numbers in PageMaker 3.02. I have been able to use the numeric keypad by making sure the Caps Lock key is down.

Diane Greenwood
Omaha, NE

Finder

With the Finder 5.0 and 6.0.x, there's a quick and easy method for adding prefixes or suffixes to a filename without carefully placing the insertion point. Select the file/folder you want to modify by clicking on it once. Press the left arrow key, and when the blinking insertion point precedes the filename, type your prefix. Press the right arrow key to deposit the blinking insertion point at the end of the filename, and then type in your suffix.

If you press the arrow keys and no insertion point is deposited, the file is locked. If that's the case, make sure the file is selected and choose Get Info from the File menu (or press Command-I), click on the Locked check box, and close the Get Info window. The tip will now work.

Barry J. Silver
Bethlehem, PA

HyperCard

Here's a simple way to simulate a toggle switch in HyperTalk (actually the basic idea can be implemented in any programming language). Each time the program executes the following line, it toggles the variable `Switch` between 0 and 1. If the value of `Switch` is 0 (off), it will change to 1 (on) and vice versa.

In HyperTalk the line looks like this:

```
Put (-1* Switch) +1¬
into Switch
```

Example 1

```
If Switch is 0 then
  Put 1 into Switch
Else
  Put 0 into Switch
End If
```

You'll find this useful because it makes your scripts easier to understand and leaner and it saves typing all the code in Example 1.

Mark Sandau
Minneapolis, MN

Word 4.0

Here's a relatively easy way to add large groups of words to Word's dictionary. Create a file containing the words you want to enter. Then select Spelling from the Utilities menu in Full Menus. Select the dictionary to which you want to add the words. When the first word is queried, create a macro (with your macro program of choice) that clicks on the + button and then on the Continue button. Assign a keystroke for the macro, and press it as necessary as you continue to check spelling in the document.

You'll find that this also makes your regular spell checking go faster, because you don't need to reach for the mouse when you add words to the dictionary.

Alexei Kosut
El Granada, CA

Here's a tip for printing screened areas in Microsoft Word with a LaserWriter IISC or other non-PostScript printer for use as table headers, highlighted table rows, and so on.

Use Word's Insert Table command to set up the text or table in which you wish the shaded area to appear. Once you have the text formatted as you desire, add a column at the left of the existing table. If this column has any borders, remove them (see Figure 3a). Use the ruler to determine the approximate width of the screen area you want (you can figure out the row height with the Cells command).

Use SuperPaint (shipped with Microsoft Word) to create a box of the size and screen density you desire. Then choose one of the 36 predefined gray-scale patterns included with SuperPaint (see Figure 3b). Paste the box into the appropriate cell in the column at the left of your table, and set the left margin of the screen paragraph to correspond with the desired screen position. Make sure the right margin of the paragraph is far enough to the right that the entire screen box fits within

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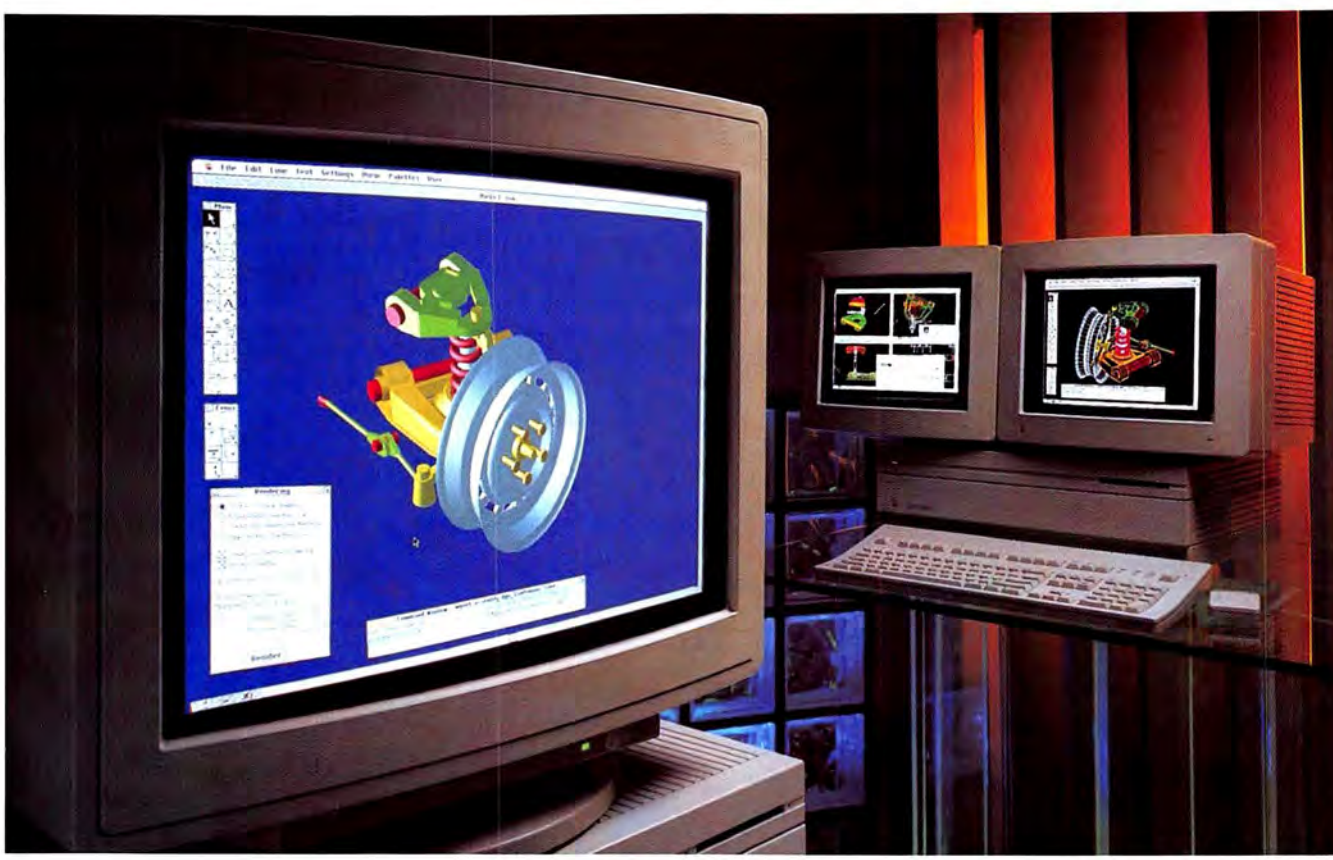
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TIP SHEET

the paragraph, or Word will add space under the paragraph that will expand the vertical space of the table row.

You won't be able to see the effect in Page View, but when you use Print Preview, you will see the screen over the text (see Figure 3c).

When you print, your text will overlay the screen. You may need to adjust the screen placement or size slightly to achieve the desired effect.

Ward Barnett
Minneapolis, MN

Word 4.0

	MONDAY 1	TUESDAY 2	WEDNESDAY 3	THURSDAY 4	FRIDAY 5
	9:00	9:00	9:00	9:00	9:00
	10:30	10:30	10:30	10:30	10:30
	Lunch Break	Lunch Break	Lunch Break	Lunch Break	Lunch Break
	1:30	1:30	1:30	1:30	1:30
	3:00	3:00	3:00	3:00	3:00
	5:00	5:00	5:00	5:00	5:00

Figure 3a: To apply a gray screen to a row in a Word 4.0 table for printing on a non-PostScript printer, first insert a column to the left of the existing table.

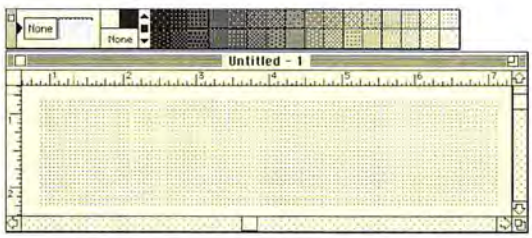


Figure 3b: Create a box with the desired pattern or gray fill in SuperPaint. You can then copy this graphic and paste it into the appropriate cell in the extra column of the document and manipulate the cell's margins so that it overprints the rest of the row.

9:00	9:00	9:00	9:00	9:00
10:30	10:30	10:30	10:30	10:30
Lunch Break	Lunch Break	Lunch Break	Lunch Break	Lunch Break
1:30	1:30	1:30	1:30	1:30
3:00	3:00	3:00	3:00	3:00
5:00	5:00	5:00	5:00	5:00

Figure 3c: In Print Preview mode, the screened cell seems to cover your text, as shown here. But when you print, the text appears on top of the screen.

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Dial up using your local access number. When connected press RETURN.

You'll see the following prompts on-screen. Your responses are printed in bold.

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User ID: **177000,5200**

Password: **Z*MAC**

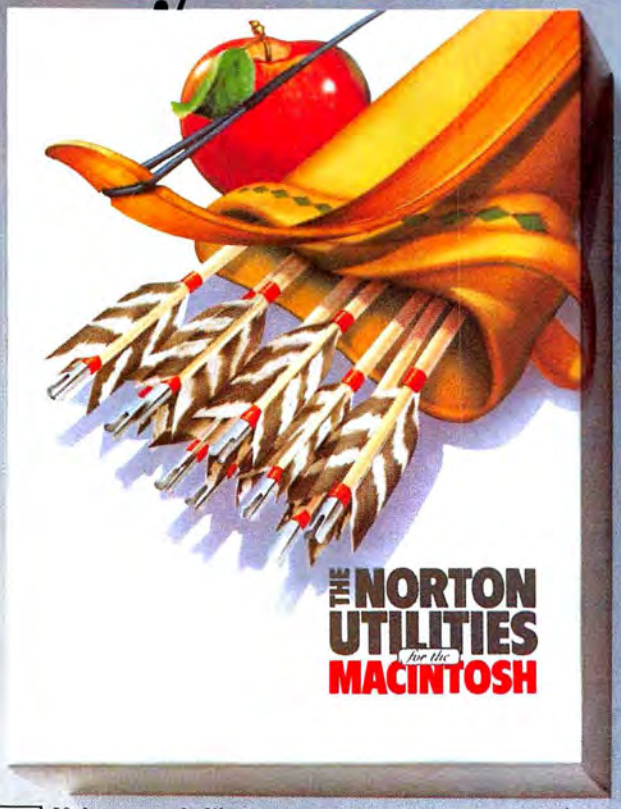
Agreement Number: **Z12D0890**

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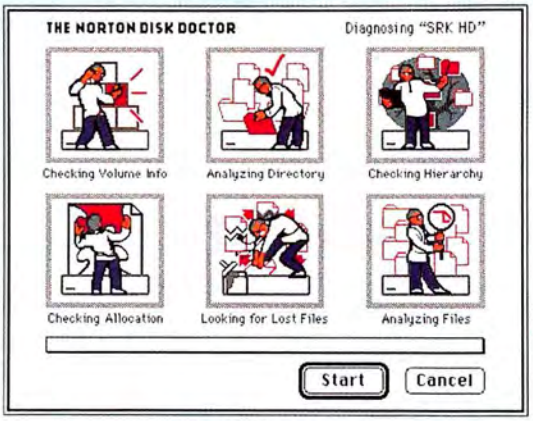
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Answers to Readers' Questions

Is your Mac sick? Need a diagnosis? Leave it to the doctor — Bob LeVitus. He's the author of Dr. Macintosh: Tips, Techniques and Advice on Mastering the Macintosh *and the former editor-in-chief of* MACazine. *Now he's also the guy who answers your questions in this space every month.*

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A Final Word on Clean Screens

Before we get to this month's tantalizing questions and answers, I'd like to clarify something I said in the June '90 issue (page 304): "Don't forget that your Mac screen is extremely susceptible to inadvertent damage. Never use glass cleaner on it or touch it with anything but a very soft cloth." Several readers wrote to inform me that the owner's manuals for the SE and the AppleColor RGB monitor contradict that advice: to wit, "If the screen gets dirty, apply a household glass cleaner to a clean cloth or paper towel and wipe the screen. Don't spray glass cleaner directly onto the screen. It could run down inside the case and damage electrical circuits."

My advice was purposely conservative — many monitor and television manufacturers warn specifically *against* using commercial glass cleaners on their products because it can damage the glare-resistant coating.

I therefore amend my advice as follows: If you have an Apple monitor and want to use a glass cleaner, go ahead, because Apple says it's OK. But if you have any other brand of monitor, read your documentation first. If it doesn't specifically say you can safely use household glass cleaner, either use a product designed for cleaning CRTs or contact the manufacturer and ask what it recommends.

Small Goof Department

In the July '90 issue (page 257), my column stated, "Dealers will charge you $120 for the deluxe [System software] upgrade — which includes manuals...." That was a mistake. Somehow, between the time the column left my Mac and the time it was typeset, a gremlin inflated the price. The suggested retail price of a complete System software upgrade from a dealer is, and always has been, $49. Sorry for any confusion.

PostScript Files from the Sun

Q. Here's a question about printing PostScript files — not EPS, but PostScript text files — that have been transferred from another type of computer (specifically, a Sun computer running Frame).

Although Word can do the job, you must convert the text file to Word format, select all the text, style it as PostScript, and set the margins to zero.

There's a program that is distributed with Adobe fonts called Downloader, but it doesn't work with Apple's Print Monitor. Illustrator and (I believe) FreeHand require an EPS-format file or at least a text file with certain header information in the PostScript file.

Do you know of any other software that I can use for downloading PostScript code to the Mac?

Bill Russell
Boston, MA

A. Yes, there's an application called Widgets and a DA called LaserStatus. Widgets is a little program that lets you download any PostScript text file or PostScript font and also lets you create "sets" of files,

IIcx Compatibility Woes

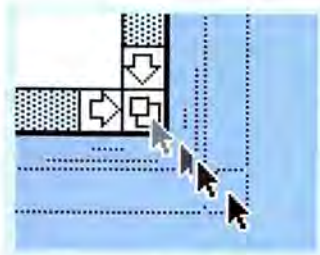


Figure 1: Some programs let you expand their windows, if you hold down the Option key and then click and drag the size box.

Q. I recently moved up from a Mac Plus to a IIcx. I transferred all my files and applications from an external hard-disk drive to the IIcx's 40-megabyte internal drive, but I'm having some problems with older applications. They either bomb or don't run properly.

Example 1: MacGolf 2.0 boots, but the golfer is ten feet in the air and his image is deformed.

Example 2: MacDraft has developed the habit of quitting while it's in use, giving the "Error Code ID = 33" message.

My IIcx had System 6.0.5 installed. Thinking the System version might be the problem, I went back to System 6.0.3, which had worked fine on the Plus. That didn't help.

One other question: Is there a way to make various applications use the full screen on the IIcx monitor? Most applications default to the Plus/SE small-screen format.

Walt Greuel
Chula Vista, CA

A. Upgrades that are compatible with the IIcx are available to registered users of MacGolf and MacDraft. You are a registered user, aren't you? If so, contact the vendors for upgrade information; if not, shame on you.

There's no easy way to make older applications "smart" about their default screen size, unfortunately. You can muck around with ResEdit and change the WIND resource, if the program has one and will let you edit it (many programs don't or won't). Don't forget — never use ResEdit on an original file — always work on a copy.

Finally, some programs will let you enlarge their windows past the size of the Mac Plus/SE screen by clicking and dragging the size box if you hold down the Option key before you click and drag (see Figure 1).

By Bob LeVitus

fonts, or a combination of the two for batch downloading. LaserStatus can download PostScript text files or PostScript fonts as well as sets created with Widgets. Although neither Widgets nor LaserStatus works in the background (takes advantage of Apple's Print Monitor), they're the fastest, most convenient solutions I know. Both are included in MockPackage Plus Utilities from CE Software (1854 Fuller Road, Box 65589, West Des Moines, IA 50264; [515] 224-1995).

MockPackage Plus Utilities is chock-full of other goodies such as MockChart, a chart-plotting DA; MockWrite, a text-editing DA; MockPrinter, a fast-printing DA; MockTerminal, a telecommunications DA; Aask, an INIT manager; FolderShare, to change privilege default settings on an AppleShare volume; Control-1, which lets you specify which cdev is active when you open the Control Panel DA; and EZ-Menu, which lets your mouse pull down menus without your having to click when you move the cursor into the menu bar.

At a suggested retail price of $49.95, MockPackage Plus Utilities is a great value, even if you don't think you need all its contents. You'll probably find most of them indispensable, however.

By the way, I mentioned Widgets and LaserStatus in July '90 (page 255) and said they were also included with CE Software's DiskTop (my favorite Finder-replacement DA). This is no longer true: They're now available only in MockPackage Plus Utilities.

What's a Developer?

Q. I'm a programmer and have always wondered what, exactly, a developer is.

Al van Royn
East Thetford, VT

A. Developers are programmers who have been "certified" by Apple. They used to be called Certified Apple Developers but are now called Apple Partners.

To become an Apple Partner, you must complete an application, submit a business plan or sample product literature, and pay a $600 annual fee. If you're approved, you get software updates, sample code, technical publications, access to AppleLink (Apple's electronic communications and information system), as well as many other goodies.

For more information on this, contact Apple Developer Programs at Apple Computer, Inc., Attn: Developer Programs, 20525 Mariani Ave., M/S 75-2C, Cupertino, CA 95014; (408) 974-4897.

Duplicate SuperLaserSpools

Q. Sandy and I have a laser printer connected to our Macs, and we both have SuperLaserSpool installed. Here's the problem: Sandy sends a Print command first, prints, and takes "priority" over the printer. When I issue a Print command, I get this message: "There is a duplicate copy of SuperLaserSpool already installed: Please see your network administrator." Conversely, if I print first, Sandy gets the duplicate-copy message on her Mac.

We examined our disks



for a duplicate copy of SuperLaserSpool but found none. We are very tidy and are careful not to put duplicate items (especially Systems) on our disks. After hours of fiddling, we gave up.

We need SuperLaserSpool. Help!

Jeri Elliott
Jubail, Saudi Arabia

A. The problem is that SuperLaserSpool uses a form of copy protection known as "network serialization." Your copy of SuperLaserSpool is licensed for a single user and has a unique serial number. When someone else on the network tries to use a copy with the same serial number, you get the message you describe. It appears that you and Sandy are using the same copy of SuperLaserSpool — and

No DAs under MultiFinder

Q. I own an SE/30 with an ImageWriter II and an HP DeskWriter printer. Recently I added 4 megabytes of RAM to take advantage of MultiFinder. Now I don't have access to the Chooser or any of my other DAs under MultiFinder. I have to restart under the Finder so I can switch printers. This is very annoying — closing all the applications, restarting under Finder, printing, restarting under MultiFinder, and opening the applications again. Is there any software that lets you access your DAs under MultiFinder?

Paul Farabaugh
Pittsburgh, PA

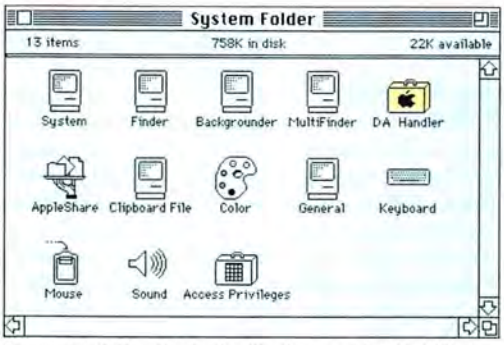


Figure 2: DA Handler is the file that enables MultiFinder to deal with DAs.

A. It sounds to me as if the problem is a missing piece of System software called DA Handler, and the good news is that it's free — it came with your Mac. DA Handler is what gives MultiFinder the capacity for DAs. You should be able to find it on one of your System Tools disks (see Figure 2). Just copy it into the System Folder on your startup disk, restart under MultiFinder, and voilà — DAs.

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that's a definite no-no.

The solution is simple — just buy another copy of SuperLaserSpool.

Upgrading FileMaker Plus, II, or 4

Q. I purchased FileMaker Plus in April 1987. I've been very satisfied with it and would like to incorporate an updated version. Can you tell me if the rights to the software were acquired by a firm other than Nashoba Systems and/or if the software is now sold under a different name? If it's the latter case, is there any way to acquire an update without buying a new program?

Andrew Mercer
Stafford, England

A. Yes, yes, and yes. The software was acquired by Claris a few years ago, there have been several new versions since then, and you can acquire the latest and greatest upgrade for less than the price of a brand-new copy.

The newest version is called FileMaker Pro and includes more than 100 new features. Overall performance has been improved by more than 30 percent, and it now includes customizable grid lines, autoalignment, and scripts that can automate any of the program's commands or series of commands. In addition, workgroup-administration features have been improved, and FileMaker can now share its spelling checker and dictionaries with other Claris applications such as MacWrite II and MacDraw II.

The suggested retail price of FileMaker Pro is $299 — the same as that of previous versions. The cost of upgrading for registered owners of FileMaker Plus is $119; for owners of FileMaker II or FileMaker 4, it's $99.

Contact Claris Corp., 5201 Patrick Henry Drive, Santa Clara, CA 95052-8168; (800) 544-8554 (domestic upgrades) or (408) 727-8227 (international upgrades).

Custom Key Caps

Q. I've made many additions to the fonts in my System file and regularly use the Key Caps DA. When I choose Key Caps from the Apple menu, it defaults to the Chicago font, which I never use. Can this default font be changed?

F. Robert Schmidt
District Heights, MD

A. It's easy — and Apple even provides the tool you need, MacroMaker, with the latest versions of the System software. Install MacroMaker, and use it to create a macro that opens the Key Caps DA, pulls down the Key Caps menu (the one that should have been called the Font menu!), and selects Geneva.

If you use one of the more powerful macro generators — Tempo II; AutoMac; or my personal favorite, QuicKeys — you can use it instead of MacroMaker to generate this macro sequence.

For another free solution to your problem, see Jon Wind's ASCII Chart DA, described in "33 Unsung Shareware Programs" in this issue. With this DA, you can see all 256 characters at once, and you can pick the default font for display. It's available from *MacUser*'s Zmac service.



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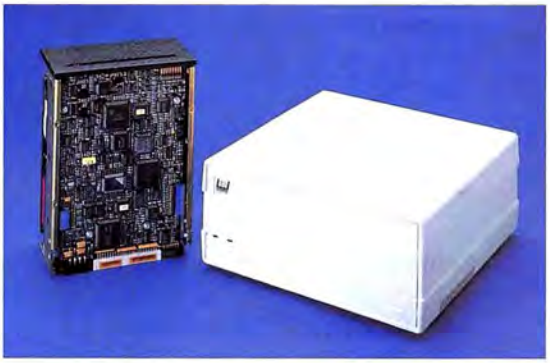
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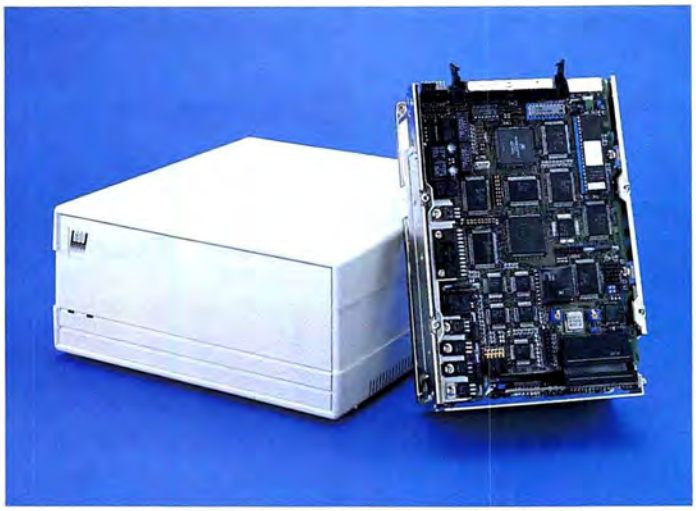
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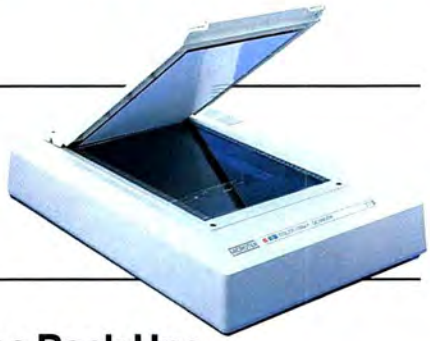


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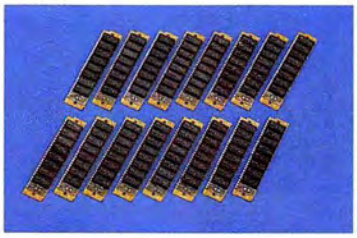
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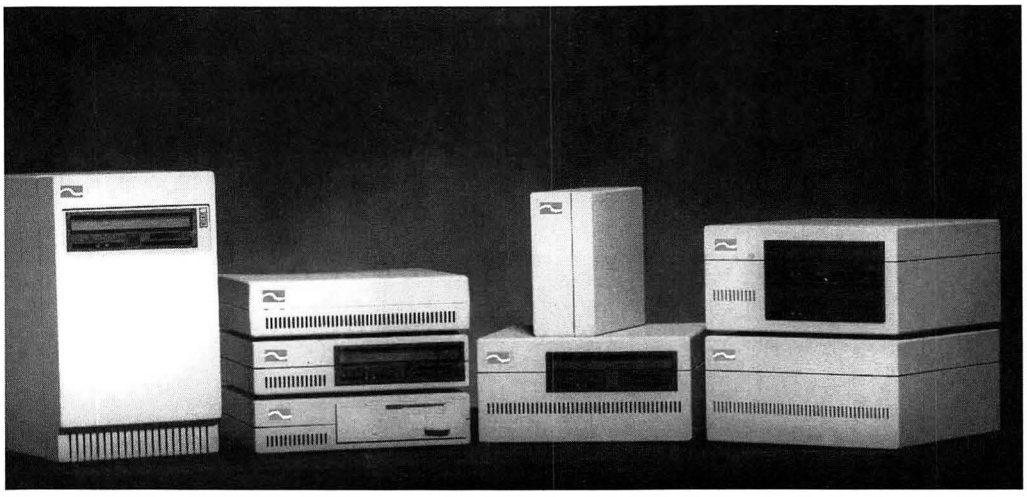
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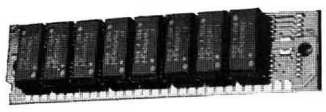
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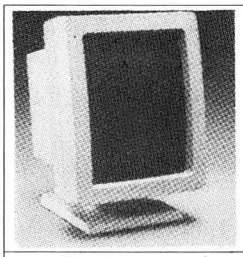
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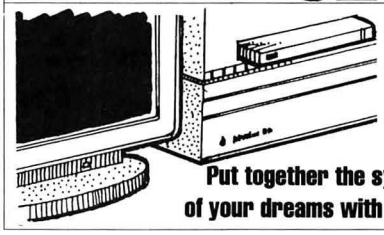
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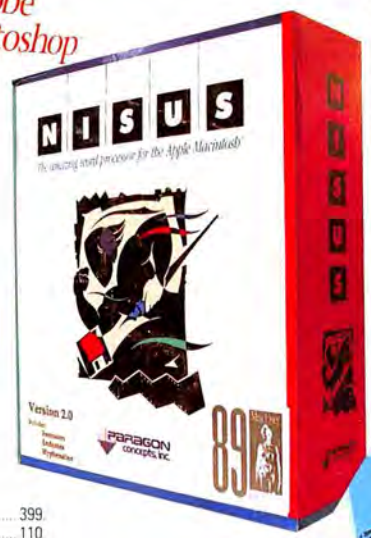
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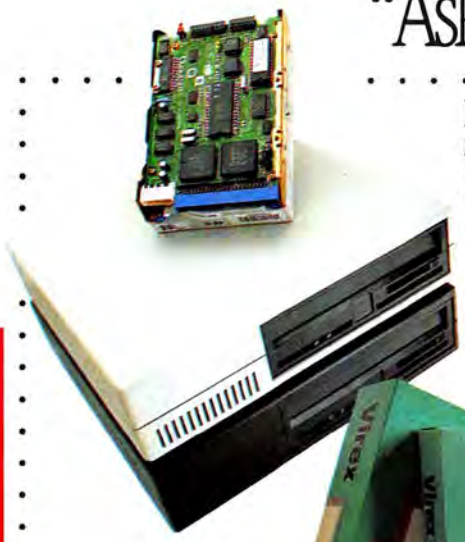
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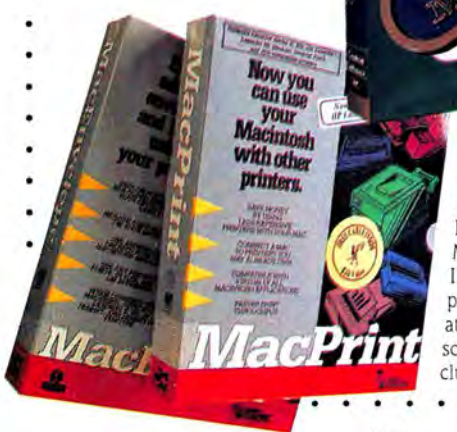
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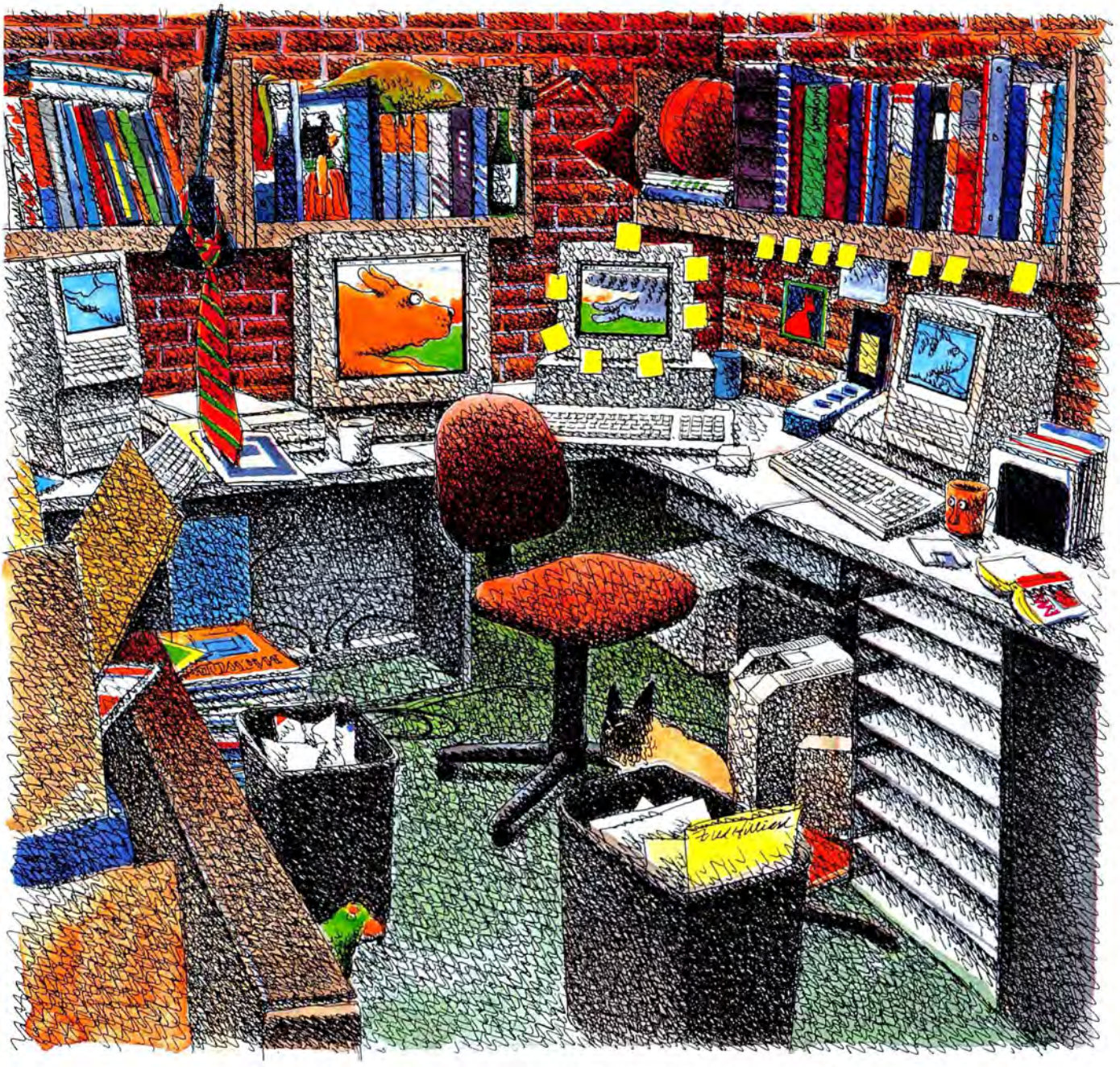
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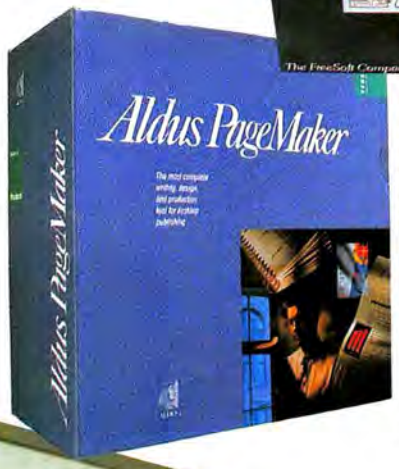
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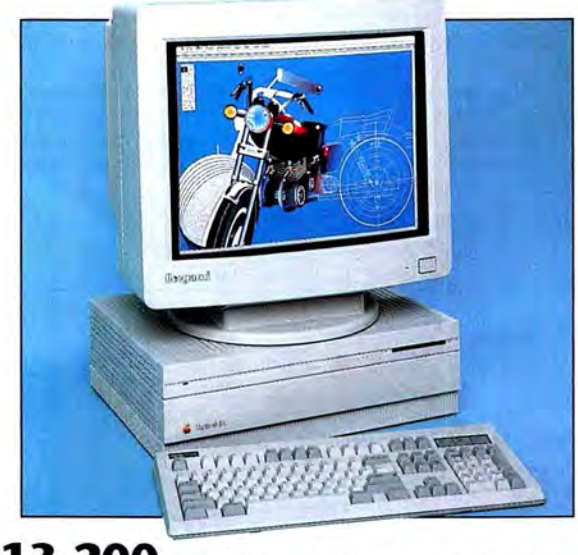
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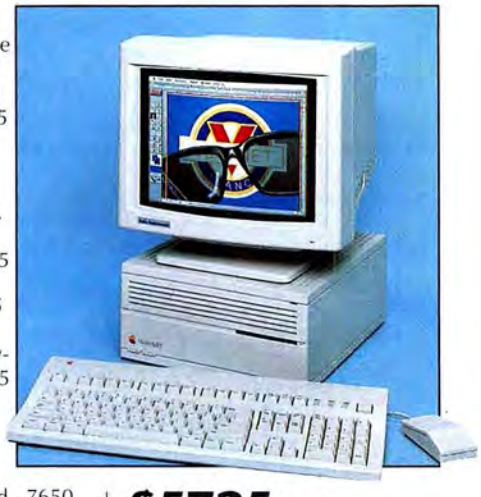
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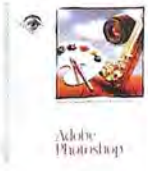
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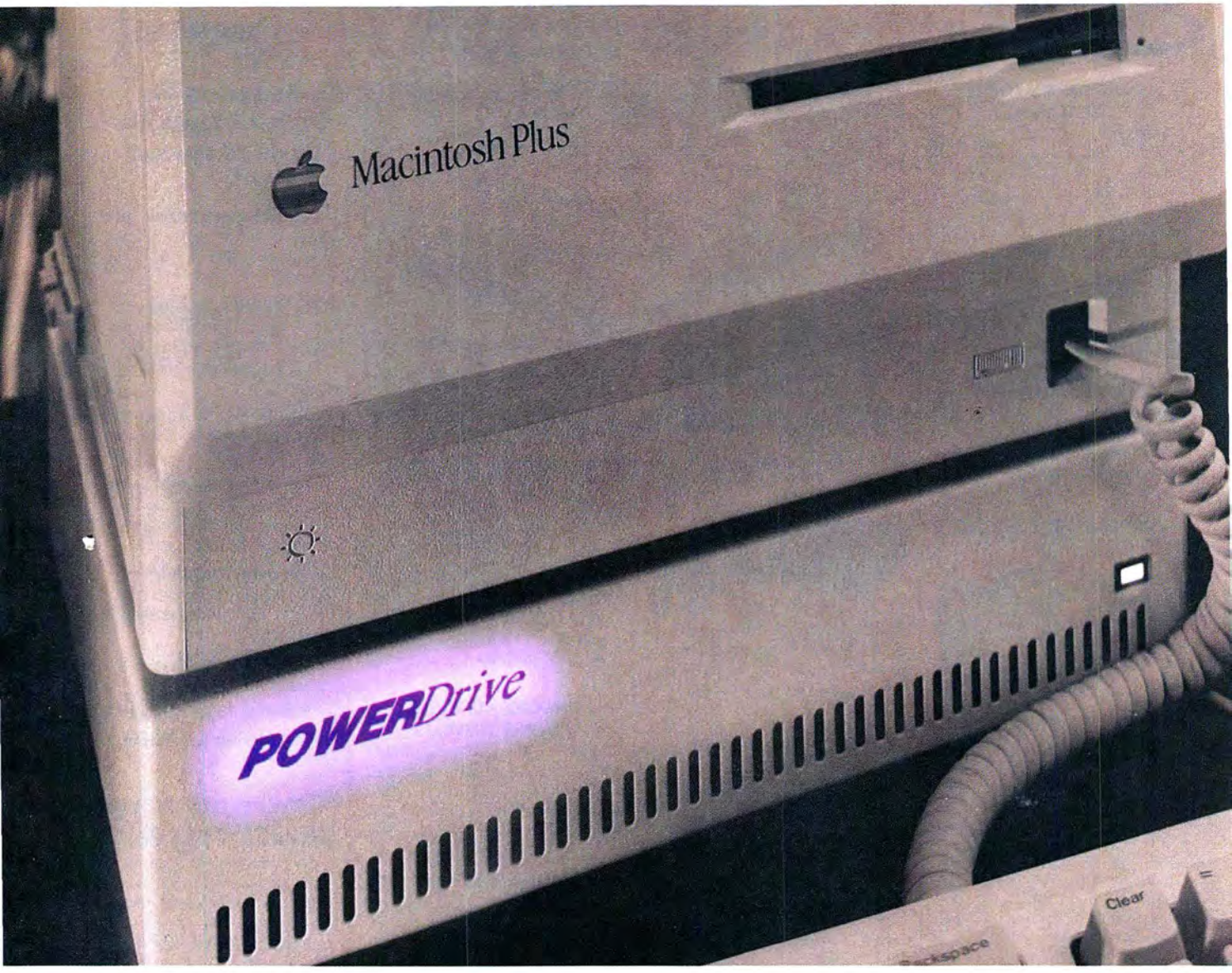
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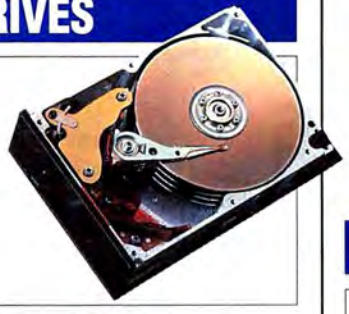


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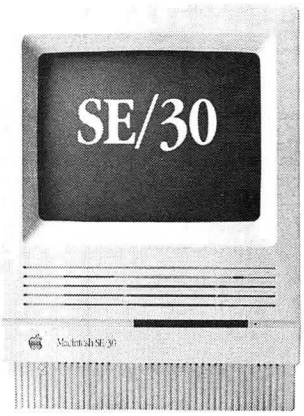
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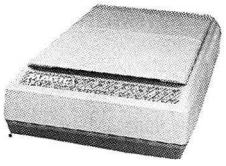
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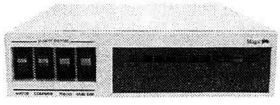
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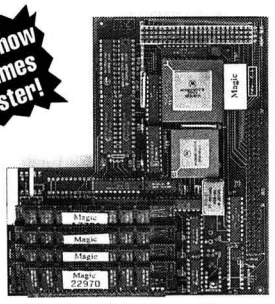
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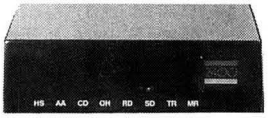
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1. Please indicate which of the following computers you currently use in your company or organization: (check all that apply)

- ☐ a) Mac Plus
- ☐ b) Mac SE
- ☐ c) Mac II
- ☐ d) IBM PC
- ☐ e) Other

2. For how many micro computers do you buy products?

- ☐ f) 1-4
- ☐ g) 5-49
- ☐ h) 50+

3. Your primary job function is: (check one)

- ☐ i) Administrative/General Management
- ☐ j) MIS/DP, Communications Systems, Programming
- ☐ k) Engineering/R&D
- ☐ l) Finance/Accounting
- ☐ m) Marketing/Sales
- ☐ n) Computer Dealer/VAR

4. For which of the following products are you involved in selecting brands/models to be bought by your company or organization? (Check all that apply)

SOFTWARE
- ☐ o) Accounting
- ☐ p) Spreadsheets/ Financial Planners
- ☐ q) Project Managers
- ☐ r) Word Processors
- ☐ s) Database Managers
- ☐ t) Graphics
- ☐ u) CAD/CAM
- ☐ v) Communications

HARDWARE
- ☐ w) Mainframe
- ☐ x) Mini
- ☐ y) PC
- ☐ z) Printers/Plotters
- ☐ 1) Monitors
- ☐ 2) Disk/Tape Back-up
- ☐ 3) Add-in Boards
- ☐ 4) Communications

5. Are you involved in the purchasing of microcomputer equipment at your company?

- ☐ 5) Yes
- ☐ 6) No

6. If so, what function do you serve in the buying process?

- ☐ 7) Evaluations/Specification
- ☐ 8) Recommendation
- ☐ 9) Buyer/Purchaser

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201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250
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1. Please indicate which of the following computers you currently use in your company or organization: (check all that apply)

- ☐ a) Mac Plus
- ☐ b) Mac SE
- ☐ c) Mac II
- ☐ d) IBM PC
- ☐ e) Other

2. For how many micro computers do you buy products?

- ☐ f) 1-4
- ☐ g) 5-49
- ☐ h) 50+

3. Your primary job function is: (check one)

- ☐ i) Administrative/General Management
- ☐ j) MIS/DP, Communications Systems, Programming
- ☐ k) Engineering/R&D
- ☐ l) Finance/Accounting
- ☐ m) Marketing/Sales
- ☐ n) Computer Dealer/VAR

4. For which of the following products are you involved in selecting brands/models to be bought by your company or organization? (Check all that apply)

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- ☐ p) Spreadsheets/ Financial Planners
- ☐ q) Project Managers
- ☐ r) Word Processors
- ☐ s) Database Managers
- ☐ t) Graphics
- ☐ u) CAD/CAM
- ☐ v) Communications

HARDWARE
- ☐ w) Mainframe
- ☐ x) Mini
- ☐ y) PC
- ☐ z) Printers/Plotters
- ☐ 1) Monitors
- ☐ 2) Disk/Tape Back-up
- ☐ 3) Add-in Boards
- ☐ 4) Communications

5. Are you involved in the purchasing of microcomputer equipment at your company?

- ☐ 5) Yes
- ☐ 6) No

6. If so, what function do you serve in the buying process?

- ☐ 7) Evaluations/Specification
- ☐ 8) Recommendation
- ☐ 9) Buyer/Purchaser

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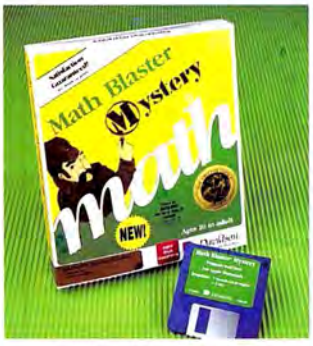
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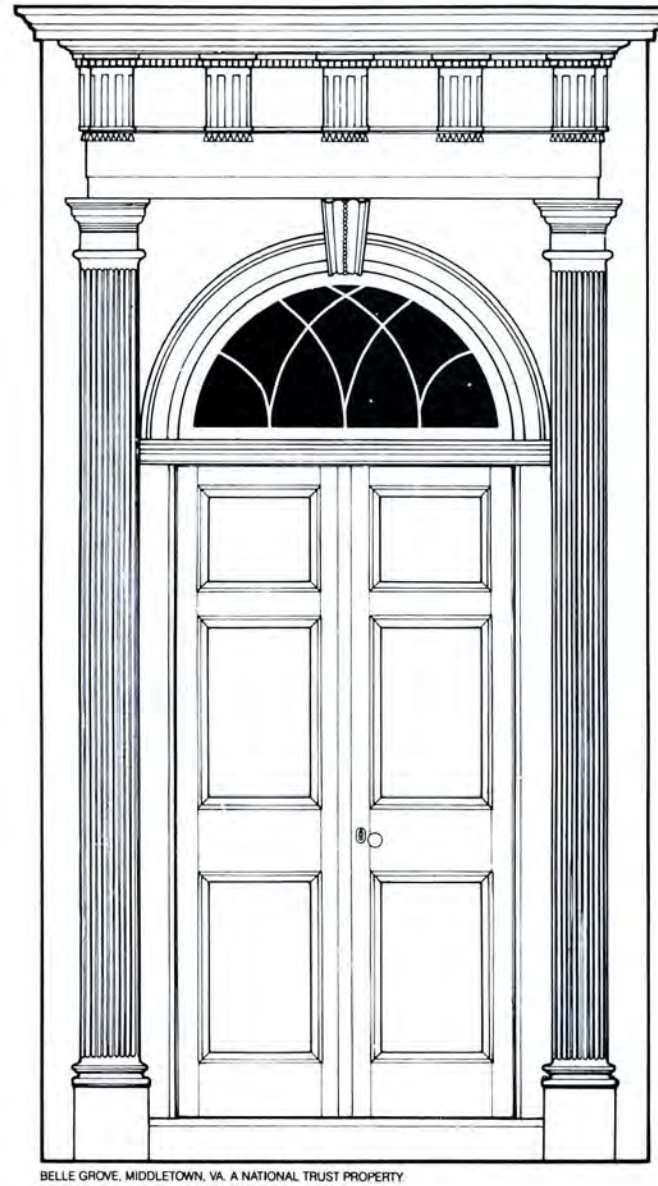
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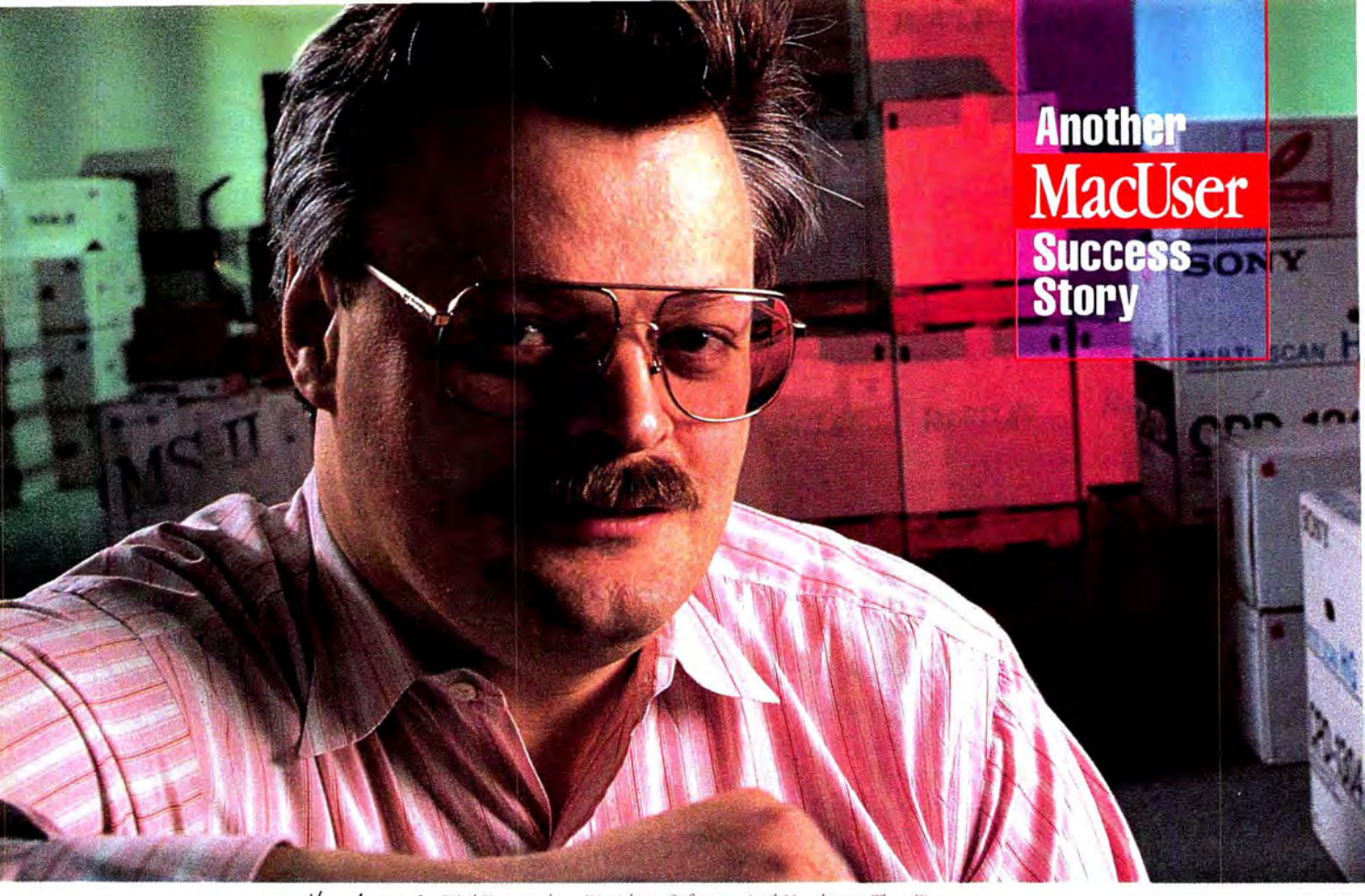
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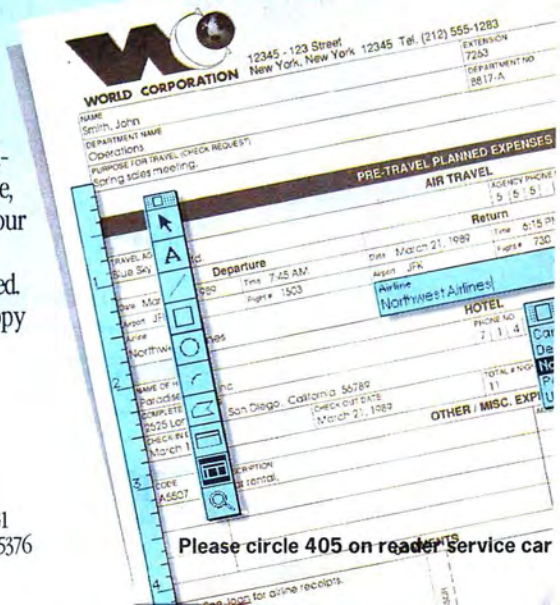
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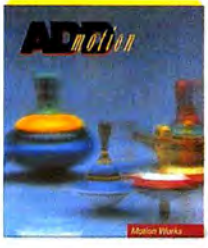
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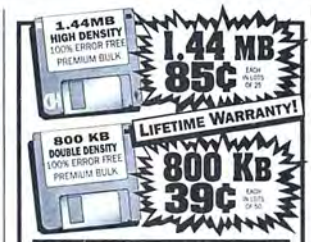
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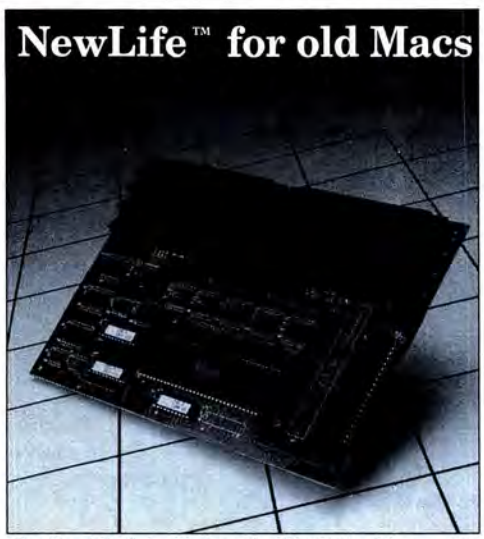
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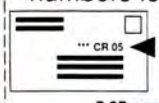
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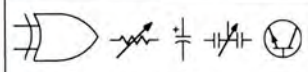
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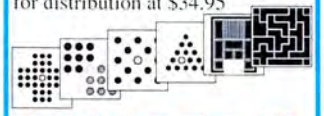
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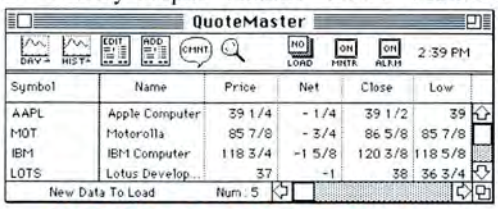
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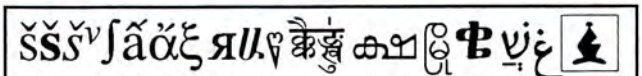
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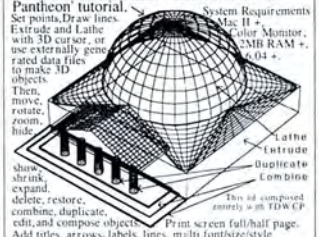
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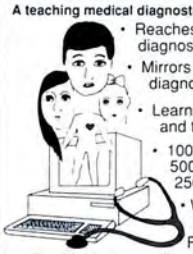
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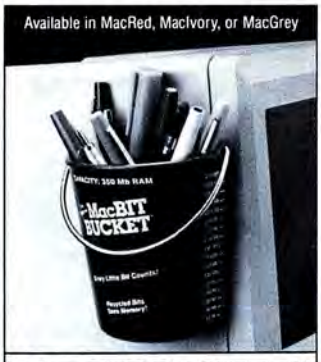


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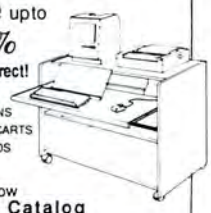
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Full-Court Press

The world has gone insane: Lotus Development Corp. has won a lawsuit over Paperback Software and its Lotus 1-2-3 clone, VP-Planner. Poor Adam Osborne, who started Paperback, never could turn the corner with this product, and he moved to Oregon to live the life of a country gentleman. Now Lotus is all prepared to sue Borland over a broader interpretation of spreadsheet cloning involving Borland's Quattro. It seems to me that Dan Bricklin and Bob Frankston — the founders of Personal Software, the company that brought out VisiCalc, the first spreadsheet program — should in turn have some sort of case against Lotus. But they were wisely bought out. Until recently, Frankston worked for Lotus.

This all means that Apple can go ahead with its look-and-feel suit against the Microsoft Windows product, and presumably with a suit against the X-Windows and Motif interface, and perhaps even a suit against the NeXT machine. Of course, it helps that Xerox's suit against Apple (based on the claim that Apple stole its interface from the Xerox Star in the first place) failed. Whew!

Apple does pretty well by these suits. It has put a few small-time Apple II cloners out of business and has threatened anyone who's even thought too loudly about cloning the Mac. Poor Akkord in Taiwan was nearly going broke trying to clone a Mac, when Apple attacked it with a suit. Kick 'em while they're down. What fun.

Of course, nobody ever talks about the suit Paul Heckel brought against Apple over the HyperCard interface. Heckel designed a product called Zoomracks some time before HyperCard was even a dream, and the HyperCard concept was similar enough to his to warrant a suit, which, as far as anyone knows, Heckel won in a secret settlement. Apple finally loses, kind of. Actually, because of some weird joint-technology exchange thrown in as part of the settlement, Apple can sue anyone who clones HyperCard.

Meanwhile, some stockholders of the Beatles' Apple record company are suing Apple over its name, because the Apple Macintosh makes music and thus could conceivably confuse the competition for public attention. Oh brother, I'm sure we're all confused here.

Let's not forget that lawyer in New York at Refac International who buys old, useless patents and then revitalizes them so that he can sue one company or other over infringement. Heck of an idea.

This all pales when we look at the possible ramifications of the war between Motorola and Hitachi, however. Motorola thought Hitachi was stealing a few of its concepts and decided to sue. Hitachi, in turn, took a good look at the 68030 chip; saw some of its patented technology; and got a court order to stop Motorola from making the chip. Motorola pulled out some big guns and was allowed to continue making the chip. Boy, Apple would be in a heap of trouble if Motorola suddenly could not deliver any more 68030 processor chips. I suspect Apple would then sue Motorola for fraud and breach of contract. Motorola would then sue Hitachi for ruining its business and, perhaps, restraint of trade. Wow, the lawyers can clean up with these possibilities.

The chip makers also love suits, and they've gone wild. AMD (Advanced Micro Devices) has been sued by Intel over its introduction of a clone of the 80287 processor used in IBM AT-class machines. As if anyone cared. Chips and Technology sued Elite Microelectronics in fear that the ex-C&T employees at Elite would steal its ideas. What ideas?

Let's not forget Atari and its just-plain-mean suit against Nintendo because Nintendo has managed to lock out anyone trying to access its system without buying chips from Nintendo. I can imagine the directors of Atari also saying, "Damn. I wish we'd thought of that trick!"

Folks, this is going to get worse and worse.

The most terrible aspects of all this began in the late 1970s, when the technophobes in Congress formed the Congress' Commission on New Technological Uses of Copyrighted Works (CONTU), which studied the software-protection issues then appearing. In 1980, Congress passed an amendment to the copyright law that said that computer programs were protected by copyright. How bold.

But neither a report issued by the CONTU nor the 1980 amendments discussed whether it would infringe a copyright to copy an interface to make compatible software. Reverse engineering, disassembly, and other aspects of cloning weren't even thought of by CONTU's staff analysts. And if they had been thought of, nobody would know what it all meant. So the courts are going to make these decisions. If you think Congress is made up of pathetic technophobes, wait until these old judges start to look at these issues.

One more part of the picture. America is like a big business. The guy at the top influences everyone below. President Bush was showcasing his office on a recent TV newscast and bragging about his typewriter, admitting he didn't know anything about computers or word processors or anything like that. Kind of proud of it. Here we are, a nation relying on the technological revolution to get us out of the next few centuries alive and the president can't understand how to work the simplest dinky computer. My God!

So the circle is complete. The judicial system has gone berserk in attempting to deal with high-technology patent and copyright issues. The legislators in Congress are making dopey laws that they don't understand. Who knows what they may dream up next? And, finally, the executive branch of government is being led by someone who thinks a typewriter is high-tech. The circle is complete. We're in the middle — surrounded. Surrounded by idiots. I think I'm going to cry.



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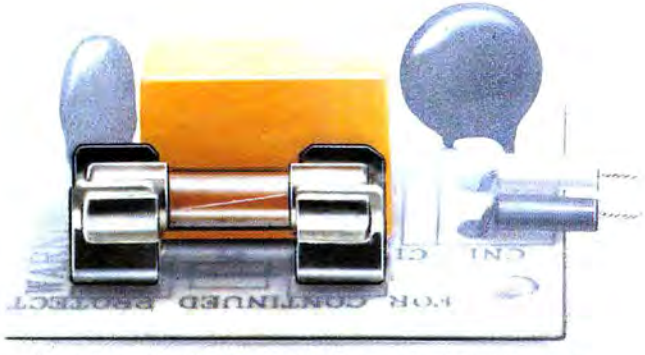
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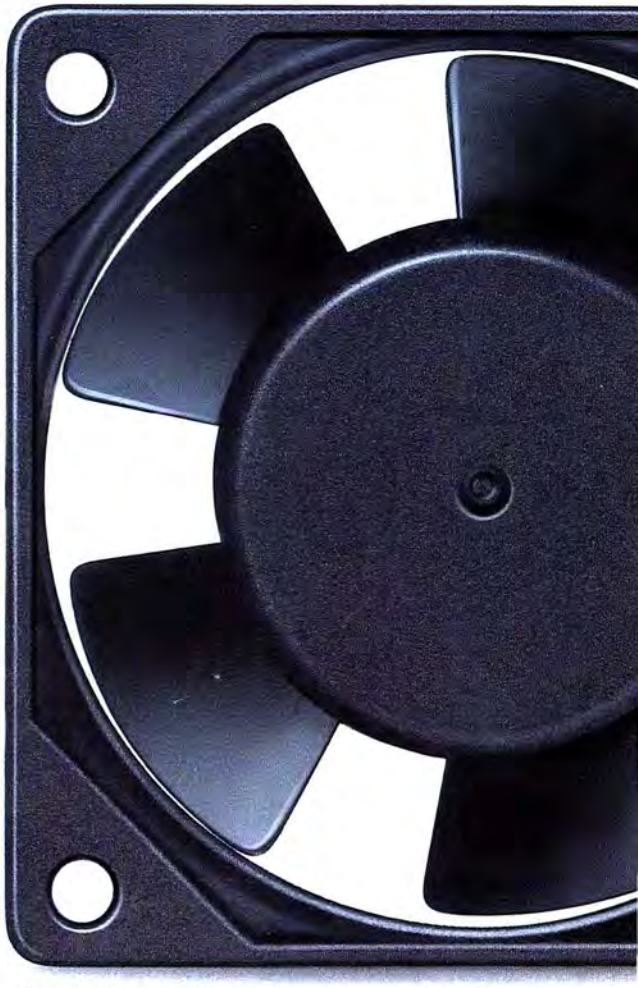
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